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September 1987

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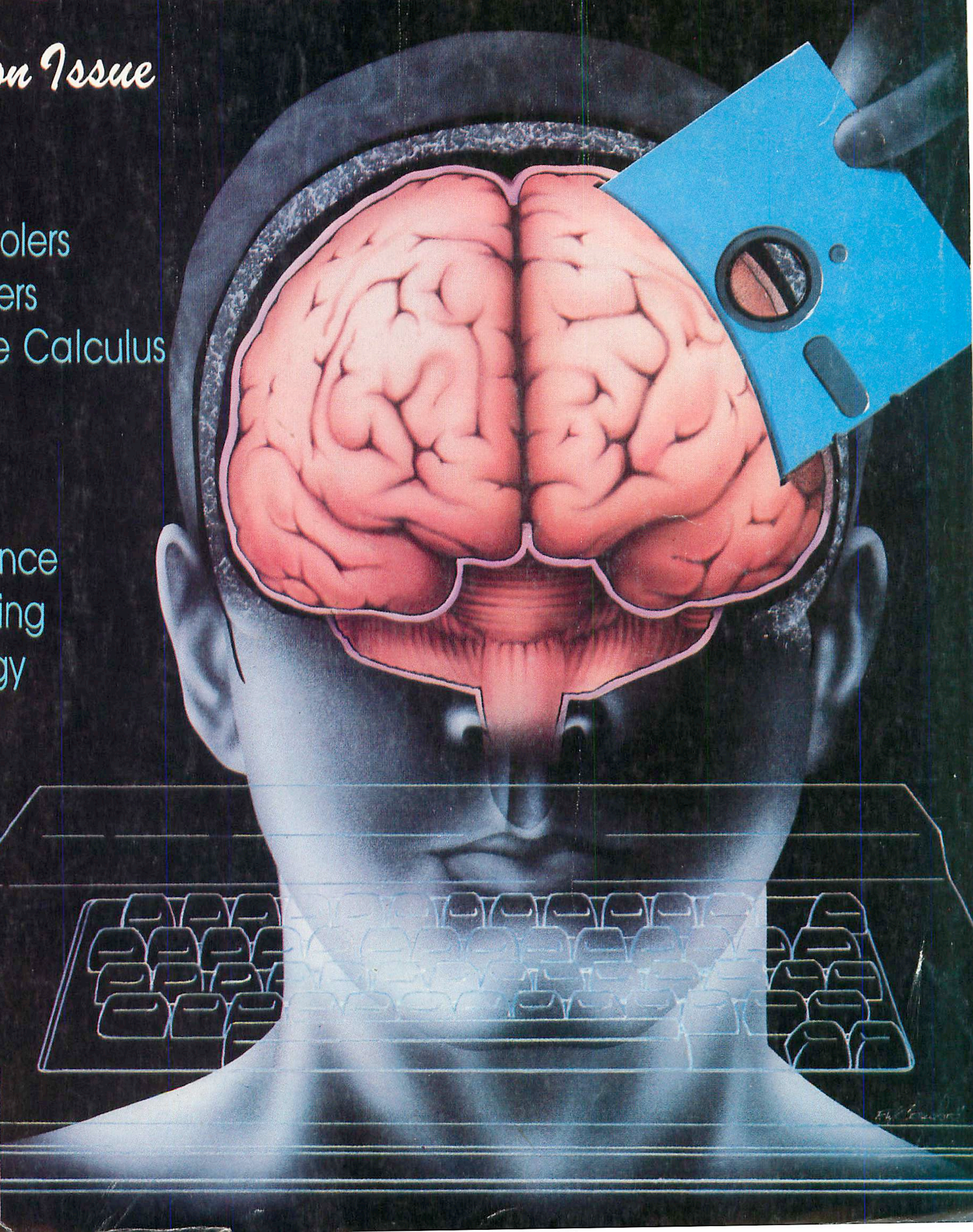

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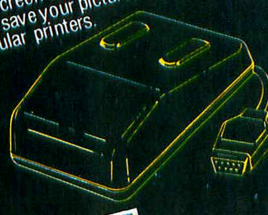

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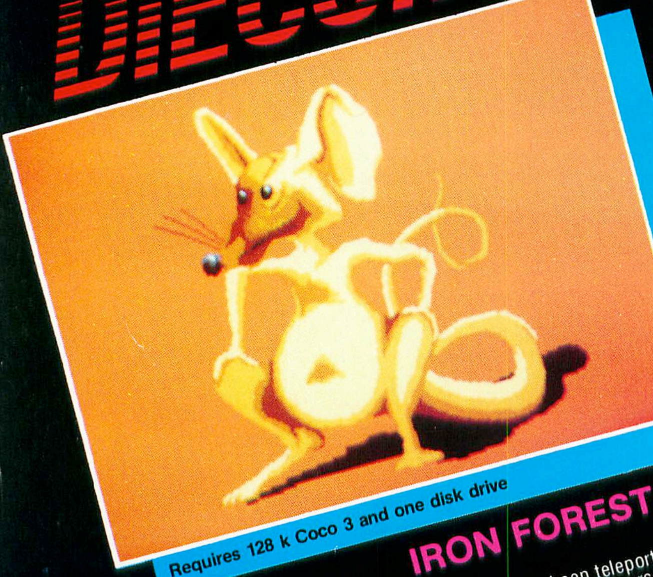

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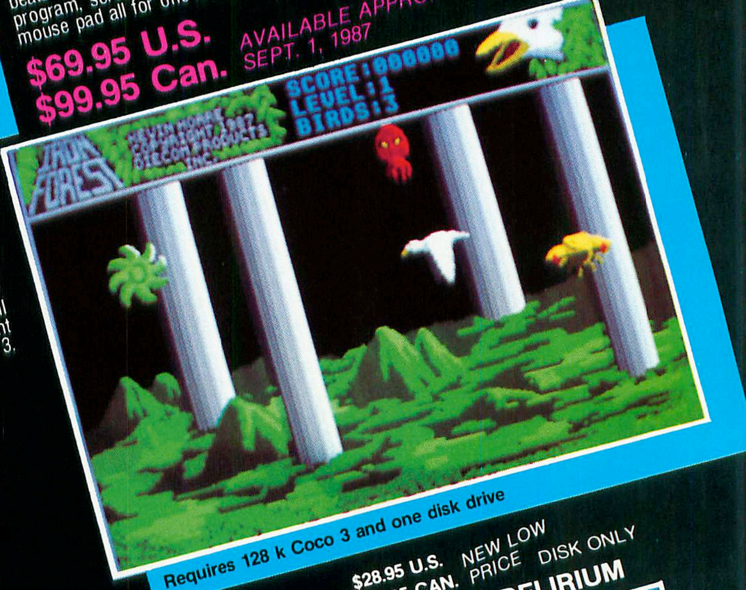

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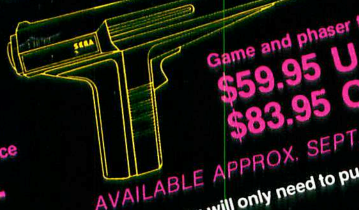

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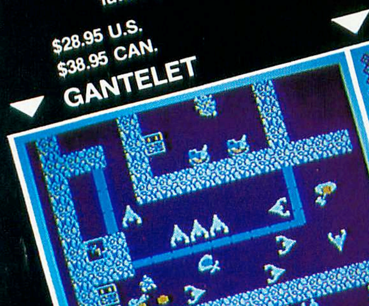

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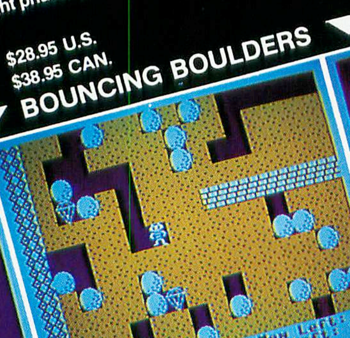

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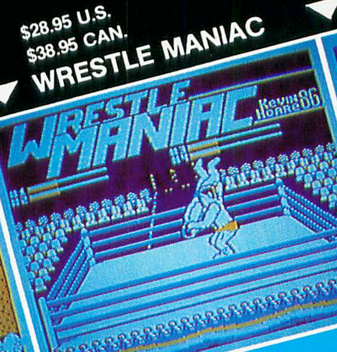

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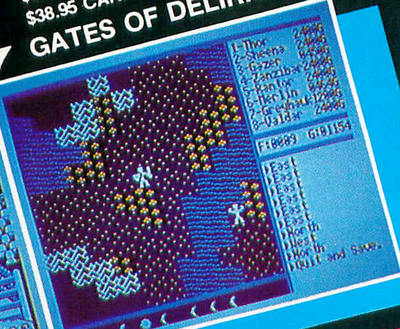

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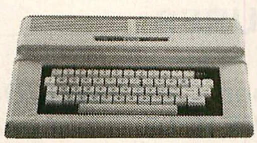

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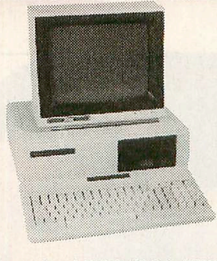

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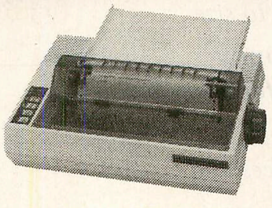

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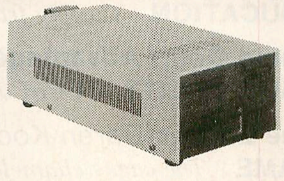

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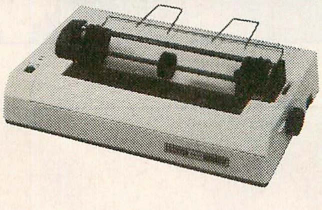

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Under The RAINBOW

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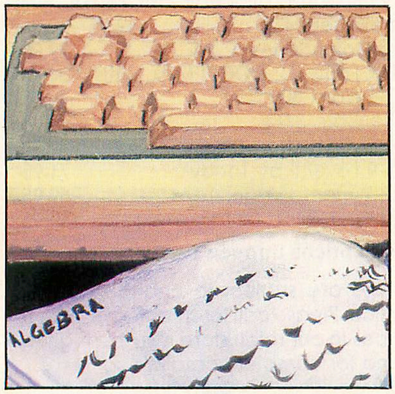
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The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on Page 169.

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NEXT MONTH: It's the RAINBOW fall festival! Ghoulish graphics and scary scenes color our pages as we present our Graphics Issue. Explore the world of color and shape as only the beloved CoCo can do it. We'll expand your drawing capabilities and teach you the ins and outs of CoCo artistry. Of course, we've included our usual round of features, utilities, games, Q & A columns, new product reviews and much more.

Come to the number one information source for the Color Computer 1, 2 or 3 — THE RAINBOW!

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The RAINBOW

September 1987 Vol. VII No. 2

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Lawrence C. Falk

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Associate Editor Jo Anna Wittman Arnott
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Contributing Editors William Barden, Jr., Steve Blyn, Tony DiStefano, Richard Esposito, Martin Goodman, M.D., Joseph Kolar, Michael Plog, Dale Puckett, Fred Scerbo, Richard White
Art Director Heidi Maxedon
Designers Tracey Jones, Rita Lawrence, Denise Webb
Lead Typesetter Jody Doyle
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Falsoft, Inc.

President Lawrence C. Falk
General Manager Patricia H. Hirsch
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Advertising Coordinator Doris Taylor
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Drumming Up Some Support

Editor:

I've enjoyed reading RAINBOW and watching with a sort of familial pride as Falsoft has grown and expanded over the years. I'm becoming increasingly concerned, though, about ongoing support of the CoCo.

When RAINBOW began appearing noticeably thinner last year, I preferred to attribute the difference to a thinner, perhaps less costly, paper stock rather than to compare the actual number of pages in each magazine. With the arrival of my June 1987 issue, however (178 pages, compared to the 210-page issues of the past year and the huge 258-page issues of May 1986 and earlier), I finally had to admit that the number of pages, and advertisers as well, had decreased significantly. I'm wondering whether the CoCo Community isn't slowly but surely losing the best remaining publication solely for the Color Computer.

If RAINBOW has been paring one 16-page form after another from its issues because of insufficient advertising space being sold, which in turn is due to a drop in mail-order sales, then in order to preserve the magazine, we as readers, users, and the ultimate beneficiaries need to better support those vendors who support RAINBOW. I have experienced far better, quicker and more courteous service and product support from RAINBOW advertisers than I ever received from Tandy. That's why I continue to support the advertisers in RAINBOW and encourage others to do the same.

Cyndi Marsico
Philadelphia, PA

As we have always said, the size of THE RAINBOW *is directly relative to the amount of advertising. The fewer advertisers, the fewer pages.*

Yes, you can help by supporting our advertisers, and by mentioning THE RAINBOW *when you order. This, frankly, is how we grew in the first place.*

We hope all of you will support our advertisers and mention THE RAINBOW *when you buy or inquire about a product. It really does help us — and as you point out, you, too — a lot.*

As far as Tandy is concerned, we would point out that they also advertise in THE RAINBOW *and support us in many other ways as well.*

What Is Piracy?

Editor:

I must agree with your stand on software piracy as outlined in the April issue. I have been in the CoCo world for four years and have some questions of my own.

There are limitations to everything, including copyright laws. For example, I run down to the local Radio Shack and pick up that new game. When I get home and open the package, I find a registration card inside. It says that I must return the card to Texas for the software to be registered in my name. My question is, after I mail the registration card, do I have the right to sell an unmodified copy of this software? If so, what are the limitations on prices I can charge? Where will it stop if even copyrighted software can legally be sold from a second party to a third, and so on?

I think system operators must be fully responsible for the software available on their BBS. But, how can he know if the software is copyright?

I remember a good example of piracy: the CBASIC software. I have seen CBASIC up for grabs on various BBSs. The only thing this accomplished was the direct inflation of the cost from the original developer. Piracy is one major reason today's software has such high price tags.

Some Color Computer users treat the communications world like a game. I see it in a very different light, because I must buy everything I use.

Terry Grant
Bakersfield, CA

It is a criminal offense to infringe a copyright, and for purposes of commercial gain, the violator may be liable for damages up to $50,000.

For more detailed information on copyright laws and what you can and can't do with someone else's programs, see Professor Edward Samuel's articles in the April and July 1987 issues of THE RAINBOW.

You've Got a Friend

Editor:

To the CoCo Community:

A few minutes is all it takes to write so we can become friends. I am 29 years old and single. I have light brown hair, I'm 5'10" tall and I weigh 155 lbs. In seven months I will have finished serving my sentence for forgery. I am serving time because I made a mistake. Doing wrong is not worth taking a chance on losing everything. The only thing a person really has in life is life.

Hopefully, after reading my letter, you will write so I can send a picture of myself and we can become good friends. I am from Louisville, Ky., and I enjoy traveling and learning all I can about computing. Perhaps there are questions about prison life you would like to ask me; maybe someone somewhere out there would like to visit a prison. Please consider writing to one of your fellow CoCo enthusiasts. Thank you!

Anthony Abrams #79051
Kentucky State Reformatory
LaGrange, KY 40032

Why Not?

Editor:

To THE RAINBOW, its staff, and all those who have a part in planning and carrying out RAINBOWfest go my thanks for the chance to speak with, and see the wares of, those companies who provide the lifeblood of our CoCo Community — our software.

Unfortunately, each year we seem to see fewer companies who are willing to make the effort to be present at these events. While I understand the expense involved on their part, I believe that in a community such as ours, where so much business is handled by mail-order, they must understand how important it is to have our once-a-year chance to "see, touch and talk."

Therefore, let me take this opportunity to thank those who made the effort and chastise those who want our business but don't seem to think we're worth the investment in customer relations.

To all the RAINBOW readers out there, I ask that you also remember those that made that effort. When you write to vendors who want our business, thank those who make the effort and ask those who were not there — "why not?"

Alan Malamut
Darien, IL

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BACK TALK

Editor:

In response to Richard M. Johnson's letter in the April issue, Page 7, I have the answers to his questions about the function keys on the CoCo 3 keyboard.

In *Deskmate*, the F1 key is the print key. The F2 key is the open file key, ALT is used to move to the top menu. The most unusual thing is that these keys were defined before the CoCo 3 came out. *Deskmate* works much easier with the added keys, too. Now with the CoCo 3 I have the keys to go with the program!

Gary Fox
Brick, NJ

The Vanishing Cursor

Editor:

In his article "Pretty Little Listings All in a Row," in the May '87 issue, Mr. Quellhorst complained about the Hi-Res text screen cursor being left on the screen after a `PRINT` statement. I have found a simple solution to his problem: typing `POKE &HF012,&H21` and `POKE &HF91C, &H21` keeps the cursor from being printed after a `PRINT` or `LOCATE` command. Another useful fix I have found is `POKE &HF015, &H21`. This causes the `HPRINT` command to overwrite whatever was on the screen below it so that you do not have to constantly clear a space on the screen to print something. Typing `POKE-&HF015, &HAA` restores the normal operation.

Clyde F. Johnson, Jr.
Port Royal, SC

HINTS AND TIPS

Editor:

There have been a number of requests for electronic circuit design programs during the past few months. A good source for such programs is a book, available at Radio Shack, entitled *Programs for Electronic Circuit Design* by David Leithauser (Catalog No. 62-1054). It's a bargain at $4.95. The programs are written in BASIC, work well on a CoCo, and will run on a number of different computers.

David J. Johnstone
Torrington, CT

Koronis Help

Editor:

This information may be helpful to anyone who has been unable to get Radio Shack's *Koronis Rift* game to run without booting off of the game disk. *Koronis Rift* will not run if started from a window or the 40-column `/term` device. If an attempt is made to run `Autoex` (the file with the game module) from one of these devices an "illegal service request" error is generated. It seems that the game uses the SS-AScrn service call (Page 8-142 of the OS-9 manual) to get its graphics screen(s). The support for this call is in VDG INT (the 32-column screen driver) and the call can only be made by a process running on the 32-column `/term` device. In order to run *Koronis Rift* you must be using the 32-column screen.

John Elliot
Fayetteville, AR

REQUEST HOTLINE

Editor:

Would you consider an article for beginners like me, that tells how to get the OS-9 programs to load and run? I have purchased the book and two disks of *The Complete Rainbow Guide to OS-9*, but have never been able to get the disks to load in my machine or even print a directory to the screen.

Thank you for the most readable magazine I have ever seen and the time-saving disk that goes with it.

Naomi Murdock
Conesville, IA

The disk for The Complete Rainbow Guide to OS-9 *require that you first boot the OS-9 operating system (available from Radio Shack). Look for articles discussing OS-9 and the beginner in future issues of* THE RAINBOW.

CoCo Politics

Editor:

I recently saw a game called *The Balance of Power* by Mindscape. It's a geopolitical game, and I am wondering if there is a similar game for our beloved CoCo.

Tom Fitzgerald
164 Lewis Ave.
Westbury, NY 11590

Rock 'n' Roll Tracking

Editor:

I'm a promoter of rock and roll bands and need a program to keep track of my band's dates, cash flow, transportation, etc. If anyone is interested in making some extra bucks writing programs, please write.

Michael Smith
17171 12th Ave. #106
Seattle, WA 98122

S.A.T. on Tape

Editor:

I am looking for a good S.A.T. program on tape. I own a 128K Color Computer 3, a CCR-81 tape drive, and a DMP-105 printer. Thank you.

Jeff Hillis
869 97th Ave. N.
Naples, FL 33963

The Scientific CoCo

Editor:

I am a high school science teacher and use a CoCo for many things in my classes. Over the past year I have noticed several articles in science magazines where computers are used for interfacing and data gathering in science classes. The CoCo seems ideally set up for this and I would like to know if any of your readers have a similar interest in this project.

David R. Evans
68 Ridge Rd. Bridlewood
Cheraw, SC 29520

In the Dark

Editor:

Can anybody out there in CoCo land tell me where I can find a darkroom database?

Dave Petre
23626 Irving
Taylor, MI 48180

INFORMATION PLEASE

Editor:

In the June 1986 issue, there was an excellent program by Martin and Jeremy Spiller called *The CoCo Piano-Synthesizer/Composer.* What a terrific helper for putting music into programs! However, in the machine language section, some of the musical notes are just a hair off, as was stated by the author. He included instructions for adjusting the "tuning." They are just too difficult for a beginner like me.

I would like to hear from anyone who has fine-tuned the assembly listing of this program. Also, could someone tell me if an assembly language cartridge is needed to load assembly language programs? I presume that the BASIC machine-language booter of this program would also have to be adjusted to obtain closer tunings, is that right?

Robert E. Pacheco
289 Coffin Ave.
New Bedford, MA 02746

Yes, some sort of assembler program is required in order to enter assembly language.

If you are using the `PIANOBIN` *file to create* `PIANO`, *yes, you would have to change some of the data values to correct intonation differences.*

Software Query

Editor:

Our school has an old, gray Color Computer with Extended BASIC and an ET board. I am seeking preschool/kindergarten software to either tap into the side slot or load into the tape recorder. Can you help me identify what software will run on our computer beyond that available through Radio Shack?

Drina Madden, Administrator
Montessori Southwest
Suburban School
8800 West 119th Street
Palos Park, IL 60464

Drive Dilemma

Editor:

I own a 64K ECB Color Computer 2 with a tape system. I am now considering upgrading to a disk system but I am confused about what type of drive I should get. Should I get a single-sided or double-sided drive? Will I be limited by getting one drive rather than the other? (e.g., Can a single-sided disk be read by a double-sided drive, or vice versa?) What does a disk controller do and are there different kinds?

In addition, I want to move on to a CoCo 3 in the future and want my disk drive to be compatible.

Kenneth W. Turner
Mobile, AL

A single-sided disk can be read by a double-sided drive. A disk controller does exactly that — it tells the disk drive what operations to perform. Check the ads in RAINBOW; *most controllers are now compatible with the CoCo 3.*

Printer Compatibility

Editor:

I have a Color Computer 2. Is there any way to connect an Okimate 10 Color Printer to my CoCo? The Plug-'n'-Print cartridge that came with the printer is for a Commodore 128 and has a 6-pin DIN connector.

If there is a way to connect the printer to the CoCo, please let me know as soon as possible, as I am purchasing the printer from a friend. I also need to know where I can purchase the Plug-'n'-Print Cartridge, ribbons, any software there may be to show how the printer works, and the special paper that the printer uses.

W.D. Caudle Sr.
Box 471 USCG
Kodiak, AK 99619-0471

CoCo Freeze

Editor:

I have a Color Computer 2 that has been upgraded to 64K by Radio Shack. Every once and a while, the computer will freeze up or do a cold start for no apparent reason. It only happens within one or two minutes after it has been turned on. Any information on how to solve this problem would be greatly appreciated.

Mark Wessner
2557 Byng Ave.
Prince George, British Columbia
Canada V2N 1E5

KUDOS

Editor:

I really enjoy Novices Niche. I have a CoCo 2, one disk drive, a DMP-105 and a Taxan green screen for which I built my own video amplifier. I would be happy to send a schematic of the video amp to anyone who wants it; it only cost me about $3 to make. I am a radar repairman so I understand hardware, but I know nothing about programming (hence the reason I enjoy Novices Niche). One thing I would like to see in Novices Niche is an alphabetizer for my directories.

It is obvious that I still have a great deal to learn, but I am now up and running with my disk drive and the credit goes entirely to the authors of the articles in THE RAINBOW! Just by reading the articles and piecing together tidbits of information in them, I am now not only using my disk drive, but I find that I have already learned more about them than a lot of non-CoCo computer owners I know! It seems like CoCo people are about the only computer owners that are as interested in the hardware as the software.

Charles F. Phillips
11 Jackson Drive
Havelock, NC 28532

That Extra Mile

Editor:

At a recent RAINBOWfest I purchased *Pro-Color-File *Enhanced** and other software written and distributed by Derringer Software, Inc. Somehow, there was a glitch in the program or disk. This is an excellent program and I really wanted to use it; when I explained this to Mr. Derringer by mail, he kindly sent me a copy of his revision. Once again one of your advertisers and a supplier to the CoCo Community has gone the extra mile and rendered excellent service after the sale. I am pleased to recommend *Pro-Color-File *Enhanced**, Mr. Dennis Derringer and Derringer Software.

Robert E. Jackson
Knoxville, TN

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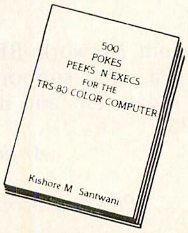

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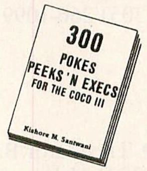

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Community Computing

Editor:

This letter is just to say thank you! I bought my CoCo 2 three years ago here in Argentina where almost no CoCo information is available. After my first steps, I found your magazine and, of course, my "computer life" changed completely.

First of all, the CoCo and you gave me friends through the penpal section. I have a lot of friends all over the world, and some of them have become very close friends. You taught me BASIC, and now you're teaching me other computer languages. The time came when I began playing Adventure games, and of course, I got stuck and there you were with the "Scoreboard Pointers" section. Thanks to this wonderful machine I've discovered a new way of computing: Community Computing. Although there are not many CoCo users here, I managed to meet a lot of people in your home country. But most importantly, thanks to you (and fate) my dream of coming to your country to study is almost true.

Luis Ricardo Blando
Mendoza, Argentina

BULLETIN BOARD SYSTEMS

- I would like to inform your readers of a BBS sponsored by the Memphis Color Computer Users Group. The number is (901) 386-7297 and features downloads, games, graphics and special sections for those that are members of the group. Associate memberships are available. The protocol is 7/E/1, and the board supports the CoCo 1, 2 and 3. The BBS also serves as an order line for The Computer Center, Inc.

Brian Wimberly, SysOp
5512 Poplar Ave.
Memphis, TN 38119

- The Canandaigua, NY, BBS is online at (716) 396-1458. Xmodem uploads and downloads, hobby section and more. Seven days a week from 8 a.m. to 8 p.m. (EST) 24 hrs. on Saturdays. 7-E-1.

Sam Fagg
Booth St., Lot #39
Canandaigua, NY 14424

- *CoBBS* #41 in Corning, Arkansas, now supports 300/1200 baud, Xmodem uploads and downloads, sale barn, four message boards, SysOp lounge, online games and more. We specialize in setting up new boards and helping new SysOps with their problems. Call (501) 857-3138, 8 a.m. to 8 p.m. (EST). 7-E-1.

Perry Parsons
Cliff Redding
1209 W. 5th St.
Corning, AR 72422

- ColorNet operates 24 hrs. a day, 7 days a week. The system features online games, online Hi-Res graphics, multiple message bases, uploads, and a download section that is growing daily. ColorNet supports 300/1200 baud and is now running on a 20 Meg hard drive from True Data Products. Call (818) 840-8903.

Pete Ellison
366 W. Providencia
Burbank, CA 91506

- I am pleased to announce a BBS in the Denver area. It is called the CoCo County Airport. It runs 24 hrs. at 300/1200 baud. It supports CoCo 1, 2 and 3 users. The number is (303) 343-6707. Several download sections and online help.

Ron A. Bihler
Aurora, CO

- I would like to inform your readers of a BBS called Dade CoCo BBS Systems. This BBS is running on *CoBBS* at 7-E-1. The system operates on a CoCo 1 with four double-sided drives, Multi-Pak, double disk controllers, RS-232 pack, and a DCM-5 Modem. Xmodem up/downloading, with about 150 downloads. There are OS-9, technical, hobby and general SIGs. 24 hrs., 7 days a week. SysOp is Robert Jones. Call (305) 266-1099.

Robert Jones
7301 S.W. 37 St.
Miami, FL 33155

- The Gator Bait BBS is online at (904) 797-3373. 24 hrs., 300/1200 baud.

Bill Case
Box 1681
St. Augustine, FL 32085

- The High Level BBS operates in the Chicago area at (312) 566-8856. High Level has over 10 Meg online for storage, and operates 7 days a week, 24 hrs. a day, 300/1200 baud. Fully supports Xmodem and has multiple message bases.

Brian Smith, SysOp
265 Rouse
Mundelein, IL 60060

- BUBBS, Belden Hill Users Bulletin Board System, is online at (607) 693-3359. The operating hours for 300 baud are 5 p.m. to 9 a.m. Mon. to Fri., 24 hrs., weekends and holidays. 1200 baud, 24 hrs. daily.

All new users may register and immediately receive 45 minutes of online time. Additional time is awarded for uploads. Call (607) 693-1659, voice or (607) 693-3359, data.

Arlin Menager
RD #2, Box 68
Harpursville, NY 13787

- Colorama BBS is back online evenings at (914) 965-7600.

Fred Suidyrn
14 Sweetfield Circle
Yonkers, NY 10704

- Network 23 is run on a 512K CoCo 3 and takes advantage of RAM disk use, and 2 MHz speed. We have text files, message bases, CoCo 1, 2 and 3 downloads. Plus online games, trial, etc. Call (614) 676-2505 at 300/1200 baud. 7-E.

Edison Carter, SysOp
3735 Stark St.
Bellaire, OH 43906

- Tao BBS is running on a 64K CoCo 1 with two double-sided drives and uses *CoBBS* Version 1.2. It is online 7 days/24 hrs. at 300 baud. There are message bases, Xmodem databases and a large BBS number section (over 600 numbers). There are also online games and more. Call (215) 598-0221.

Bob Watson
RD #2, Box 262
New Hope, PA 18938

- The Freedom Network BBS located in Honesdale, Pa., and supports 300/1200/2400 baud, 8 data bits and no parity. Call (717) 253-4354.

Andrew Robinson
RD #1, Box 4
Pleasant Mount, PA 18453

- *CoCoBBS* is online 24 hrs. Downloads and SIGs for TRS80, Apple, IBM, IBM clones and CoCo. Community bulletin board area where you can post and look at for sale/want ads free of charge. This is not limited to computer items but is open to anything legal. There are presently jobs wanted, electronic misc., household items, real estate and cars. Use post ads in the community board area. Call (608) 735-4509, 300 baud.

Robert Howard
RR 2, Box 23B
Gays Mills, WI 54631

- The Madison Area Tandy Users BBS has over 10 Megs of Color Computer downloads and a very large and interesting message base. Call (608) 274-6922 any time using 8-N-1. The system supports 300/1200/2400 baud.

Francis Selje
P.O. Box 514
Marshall, WI 53559

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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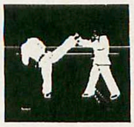

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Rainbow Police Combat Vaporware

We're in sort of a quandary here and think we've found a solution. Here is what we are up to:

For the past several months, I have been concerned about the proliferation of "new" software "companies" in the CoCo market. By this, I mean not only brand new ones, but some that have recently reappeared with the advent of the Color Computer 3.

It is obvious that many of you are concerned, too. Some are on the same basis as I am, as observers of the market in general. Others have a more personal interest: You've ordered something from someone and it has either failed to arrive, will not run when it does or does not seem to be quite what it was purported to be.

In a number of the latter cases, efforts to get a refund, replacement or whatever have, as many times as not, failed to be successful.

After receiving quite a number of letters about this problem from all parts of the country (and a few from other countries, too), we have traced most of the problem to our "Received and Certified" section of the magazine. In almost every case, someone saw a notice of a program in "Received and Certified" and ordered the program (or other merchandise).

Let me explain how this section of the magazine works. When a product comes in for review, we first load it into a CoCo and give it a very quick once-over. (I am using the example of a program here, but we do similar things for non-program products.) This is so that we can ascertain that the product is what it purports to be and that it, indeed, will load and run. Having done that, we feel we can safely say the product does "exist," which is the reason for the Rainbow Seal of Certification.

The Seal program, by the way, was designed years ago to combat what is now known as "vaporware" — products that were announced but not completed. Some firms went so far as to advertise such products. That this problem does not really exist today in the CoCo market is, I think, testament to the effectiveness of the Seal program.

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SUPER EDITOR: Scroll thru Bas. Progs. #177
SUPER PAINT: 65535 patterns! #178
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Once we award a Seal, we forward the product to a reviewer for a formal article, which will eventually appear in the magazine.

Let me preface what I say next by emphasizing my undying support for so-called "kitchen table" software and hardware developers. THE RAINBOW, in fact, started life, literally, on my own kitchen table.

But, it seems we see a trend of using the "Received and Certified" section of THE RAINBOW as a sort of classified advertising forum for "new" companies. And, because of our deadlines, by the time the review comes out, tens of thousands of people have already been exposed to some mention of the product.

Frequently, many of these small, new companies are less than prepared for business. Consequently, they quickly get into some trouble early on, get frustrated and give up. Sometimes they give up with your money in their pockets.

This is not a seminar on how to get into the software business, but it is an effort to try to help everyone. The truth is that writing, debugging and documenting a program is but half the battle. You also have to consider *how* you will sell what you have done, *how* you will send your product to customers, *how* you will provide customer support and *how* you will answer questions from people who may call or write for more information. You must price your product in an effort to take all of those things into consideration.

If you have done things such as this, you are ready to start business. You are, to use a phrase, *in business*. If not, you aren't.

For those of you interested in being in business, you should know almost everyone started out this way. Even the largest firms "opened their doors" on their "kitchen table." It can be done. It has been done many times and is still being done today.

However, I feel we at THE RAINBOW are under an obligation to you, our readers and members of the CoCo Community, to be certain that those who offer products to the CoCo Community do so with a reasonable chance of doing the things you expect them to do. That is one thing we think is important. The other is that we continue to provide an avenue for new vendors to move into the CoCo market.

That is the quandary. If we "police" new vendors, we provide a greater level of protection for you, but, at the same time, we limit their access to the market.

Here is how we hope to solve all of this: Since most of this activity revolves around our "Received and Certified" and review process, we have instituted a policy that we will always accept a "first" product from someone in "Received and Certified" and that we will send it out for review. However, we intend to separate products from these "first-timers" from those by established firms. The same goes for reviews, in that we will identify a product as being the "first one" from a vendor.

To accept a second product as "Received and Certified" and to be sent on for review, we have established some guidelines that are basically designed to protect you. The purpose of these guidelines is to ascertain whether the vendor is really *in business* and understands what he or she needs to do to meet his or her obligation to customers.

The end result of this should have two effects. First, I think we will see fewer problems in the buying and selling of products. And, second, we will no doubt see the list of "Received and Certified" products (and reviews) getting shorter. To deal with the latter, we plan to do some update reviews of products that have been on the market for some time and which re-reviewing would benefit our Community.

As I said, this has been something of a problem for us — and more so in recent months. However, I think in the end, it will be a modification to our popular "Received and Certified" program and our review process that will help us all.

* * *

While on the subject of how we do business here, I would like to print part of a letter I wrote to a company that complained about a review. The only part that has been changed is that which refers to the company:

> *What disturbs me is that you seem to think as a "paying advertiser" you are entitled to some special treatment, some sort of dispensation. If you pay us money for an advertisment, your letter says, you are entitled to:*
>
> *1. Special consideration when we write your review.*
>
> *2. Immediate listing of your new programs in "Received and Certified," despite when they might have come in and what our production schedule might be.*
>
> *3. Printing of every single letter that is sent us about your program.*
>
> *4. Printing of any letter we might run word-for-word (I do not hear you say we changed the meaning of any letter).*
>
> *No way. The first duty of* THE RAINBOW *is to its readers. Perhaps that is a dumb way to run a magazine, since advertising pays the bills, but that is the way this magazine works (it is the way all good magazines work, too). You cannot influence the editorial content of the magazine simply by advertising.*

I also told the advertiser about a review I wrote myself in the early days of the magazine. The program was awful. I recommended erasing the cassette it came on and using it to tape music. My letter continued. . .

> *Of course the guy cancelled his ad. I knew he would. But I also knew* THE RAINBOW *wasn't going to recommend buying it. It was an interesting moment, because I'd worked in journalism all my life and had always espoused the theory of separation of advertising and editorial. But I came to the moment of truth pretty early in the magazine's development, and I am glad to say that I came down on the side of journalism. I would like to think that has been one factor that has helped make* THE RAINBOW *into what it is.*

And I would like to still think that.

—Lonnie Falk

Hint . . .

VIP Colors

If you're tired of the present color options with *VIP Desktop* and you have purchased a CoCo 3, you are in luck. Just use the `PALETTE` command to change palette numbers 8 and 9 to any values between 0 and 63 before entering `LOADM"DESKTOP"`. This will change your foreground and background colors respectively. You will find that some color choices work better than others, but I have found that, by choosing proper values, I can get razor-sharp images with *VIP Desktop* on an ordinary TV.

Colin D. Stevenson
New South Wales, Australia

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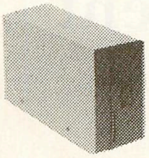

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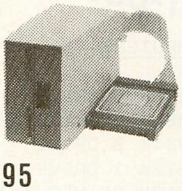

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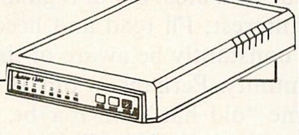

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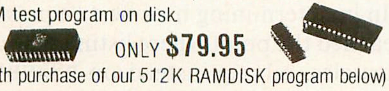

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BUILDING A RAINBOW

Continuing Rainbow's Development

As excited as I am about this, my first issue as managing editor of RAINBOW, I try to keep things in perspective. While it's a big step for me, the fact is, THE RAINBOW has enough momentum that it could almost run itself. Dozens and dozens of people doing hundreds of various tasks combine their efforts to create each month's RAINBOW. Add to this all our monthly department editors, the many regular contributors, and the advice and counsel of thousands of avid readers, and one begins to realize that THE RAINBOW is the creation of many, many people. While this may not seem to be a revelation to you, it helps me breathe easier, as I plan to take advantage of all the help I can rustle up in the days ahead.

We are taking a hard look at every aspect of RAINBOW and we can use your help. Perhaps you've said to yourself, "Gee, if only RAINBOW would . . ." If so, tell me about it. Yes, we've always asked for — and received — much advice about how to build THE RAINBOW, and the magazine has undergone a gradual but constant evolution. Now, though, we are considering sweeping changes — if warranted — and we do want to hear your suggestions. While I hope to hear from most of our regular contributors, let me assure you that, with equal interest, I'll read and heed advice from the newest reader, because we must constantly be aware of the needs of the newest member of the CoCo Community. Perhaps in our years of making RAINBOWs, some things have become "old hat" and maybe we take some things for granted when we really ought to be explaining it better. It just might be that the newest CoCo user has the very best suggestion, but we won't know for sure unless we hear from you.

For instance, should we add a new department? Eliminate an existing one? Is there an area largely untapped? An area sorely overworked? Are our issue themes reflective of your interests? Do we need some new topics? Would three-column listings be OK if it meant more material could be shoe-horned into each issue of the magazine? Is there enough OS-9 material? Or, too much?

When I became the third editorial staff member of RAINBOW several years ago, we had three filing cabinets. Now, we have 30 — 10 times as many, and they're brimming with some 4,000 submissions. But, we can only use a dozen or so each month. We've an embarrassment of riches in terms of available material, but we need your help in determining how best to present the cream of the crop to you. Have we reached the point where listings should be eliminated in favor of many more articles, relying instead on RAINBOW ON TAPE and RAINBOW ON DISK and our Delphi listings? Well, I sort of doubt that, but we want to challenge the basis of *all* of our production — with an eye to changing what needs changing and preserving that which has proven to be successful.

Yes, we have momentum and, with your help, we plan to keep on rolling along. In fact, the more of us who work together, push together and plow ahead together, the more momentum we'll have and the more unstoppable we'll be. So, let us hear from you! Take *an active* role in the continued development of THE RAINBOW.

— Jutta Kapfhammer

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CoCo III Multipak PAL chip **$19.95**
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Better CoCo III Graphics . **$24.95**

CoCo MaxII/CoCo3 Patch* **$29.95**
CoCo III Service Manual **$39.95**
512K CoCo III Computer **$299.95**
* - Req. 26-3024 M/P Interface

All orders plus $3 S/H (Foreign add $5) - NYS Residents add Sales Tax
Most orders shipped from stock. Allow 1-3 weeks for processing backorders.

Color Max III Font Editor $29.95

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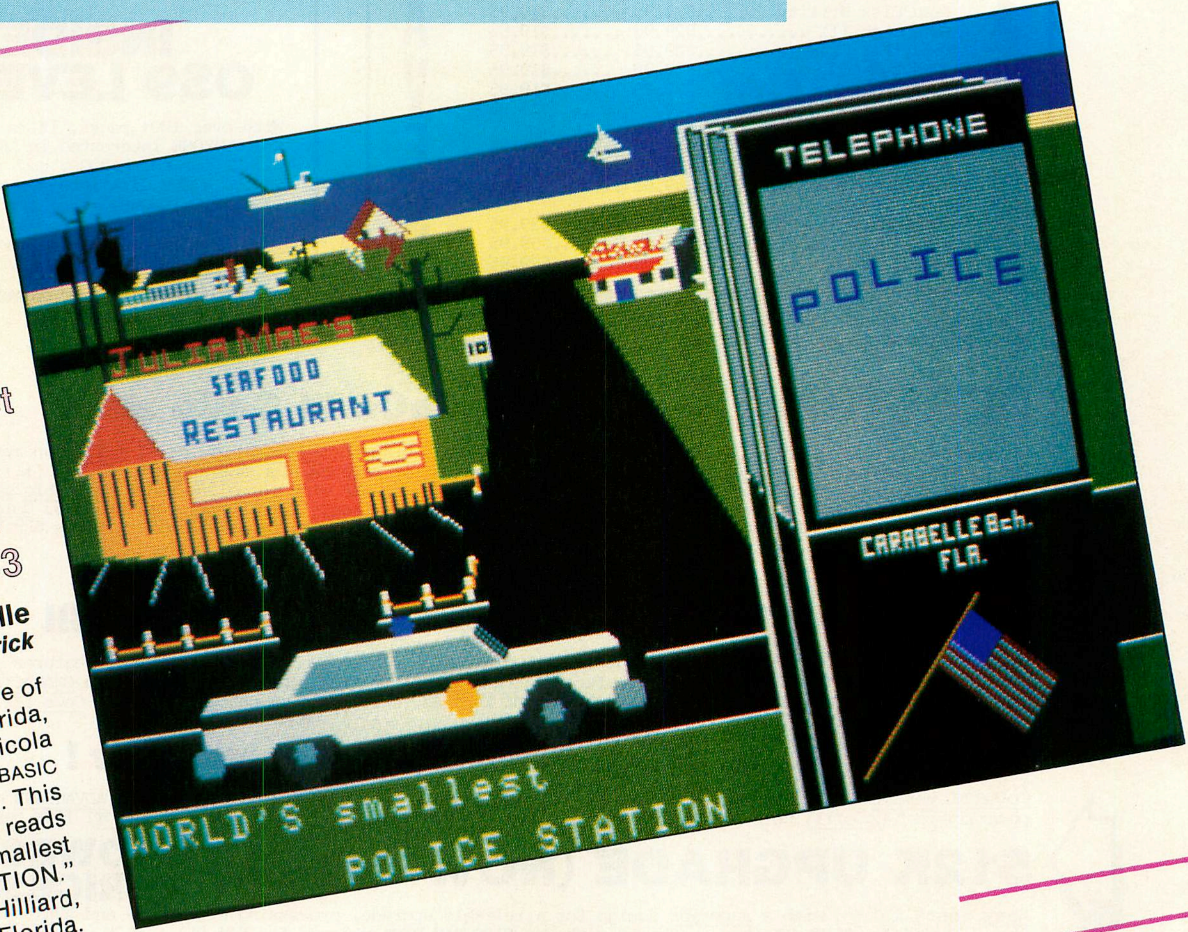
CoCo III Assembly Language $19.95

See our other ad on page 67!!!

The CoCo Gallery

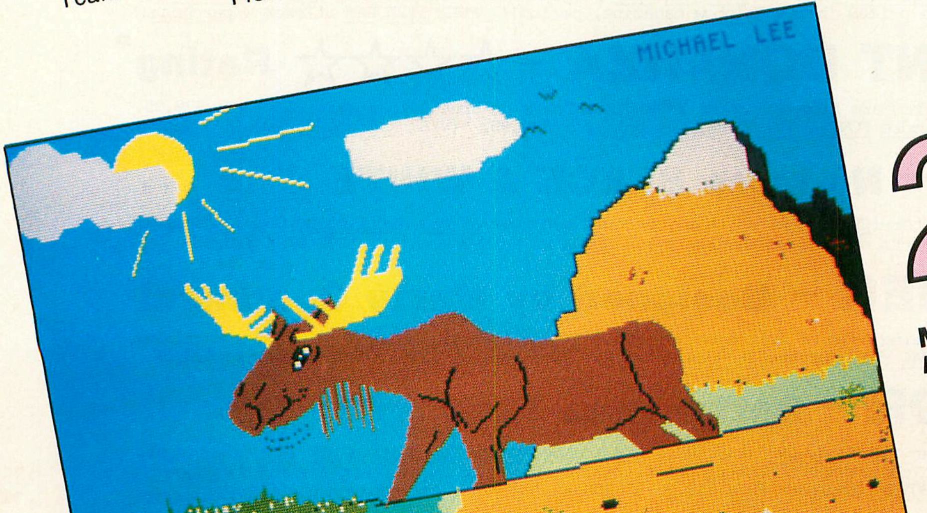

TELEPHONE
POLICE
CARABELLE Bch. FLA.
JULIA MAE'S
SEAFOOD
RESTAURANT
10
WORLD'S smallest
POLICE STATION

1st

COCO 3

Carabelle
Teakie Hamrick

This beautiful scene of Carabelle Beach, Florida, located on Apalachicola Bay was created in BASIC on the CoCo 3. This phone booth now reads "WORLD'S smallest POLICE STATION." Teakie lives in Hilliard, Florida.


MICHAEL LEE

2nd

Moose
Michael Lee

Michael of Massapequa, New York, used *Color Max 3* to create this majestic creature of the North. His hobbies include computers and drawing.

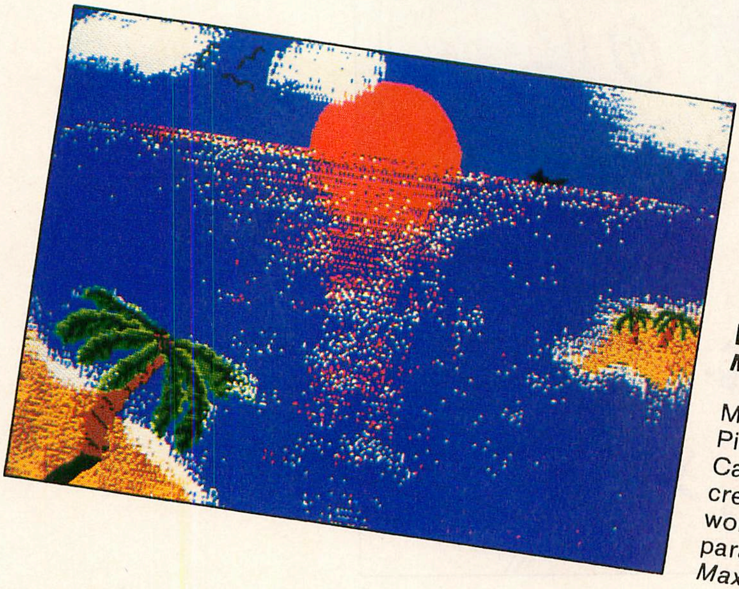
SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

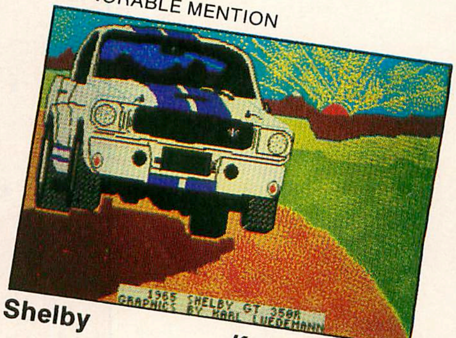


3rd

Paradise
Mike Swisher

Mike lives in Pineville, North Carolina, and created his wonderful idea of paradise with *Color Max 3*.

HONORABLE MENTION



Shelby
Karl Luedemann

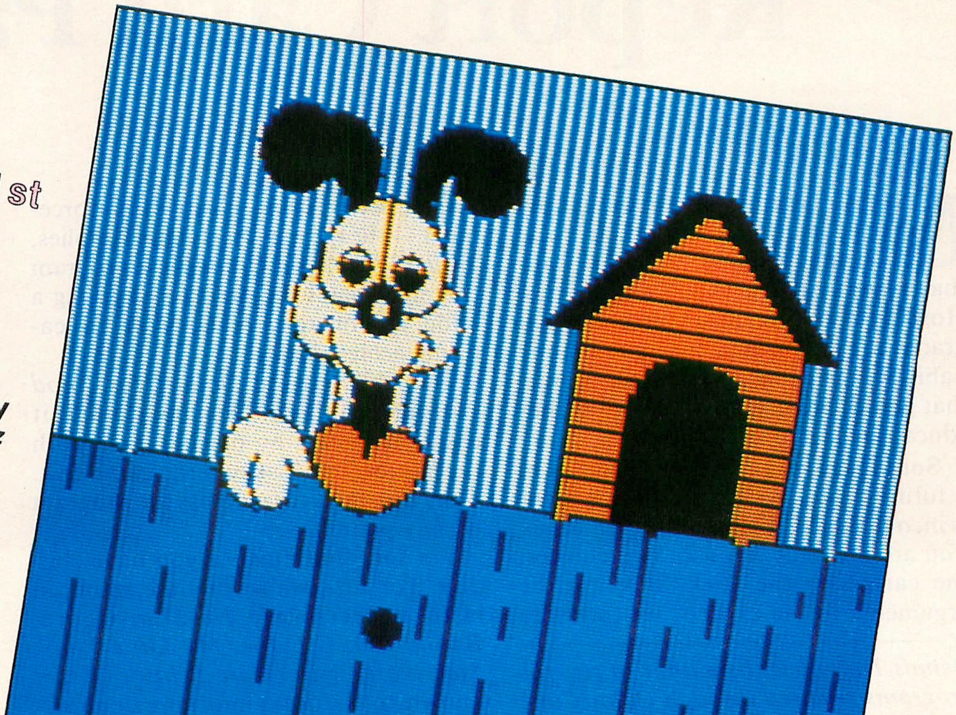
Karl created this graphic of a 1965 Shelby GT 350R with *Color Max 3*. He lives in Indianapolis, Indiana.

1st

COCO 1 & 2

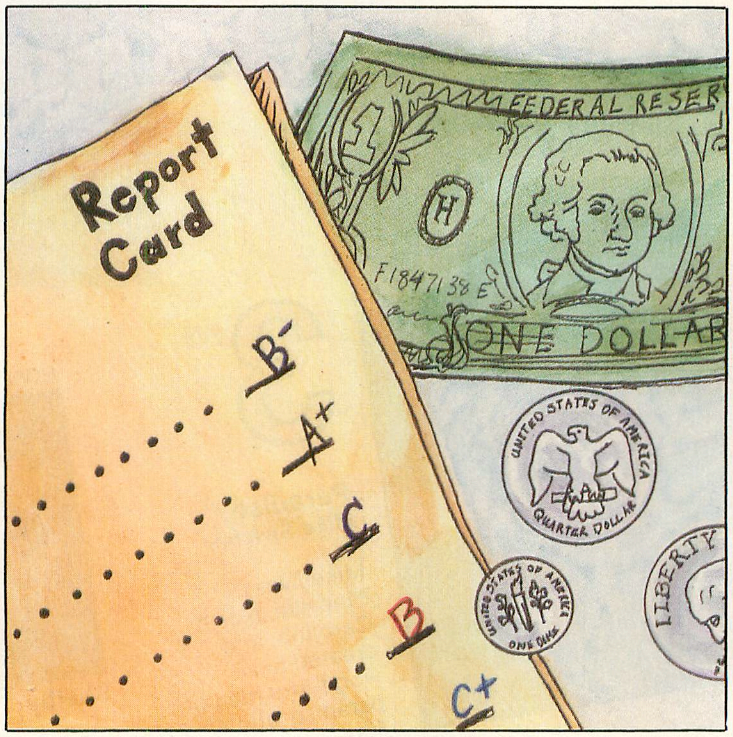
Puppy
Domingo Martinez

Domingo created this "perky puppy" scene in BASIC. He lives and attends high school in Miami, Florida, and would some day like to get a job doing commercial art with computers.



16K
ECB

Good grades can be rewarding!



Report Card Payoff

By Dennis Dorrity

Most parents have experienced the frustration of their child bringing home a report card that is not up to the child's capabilities. How do you explain to the child that grades are important; that good study habits transfer to good work habits; that grades are used to mete out higher education and future careers?

Sometimes you can't. The concept of a future that is six or eight years away is inconceivable to most young children. You are basically left with two choices: the carrot or the stick. Leaving the arguments to the experts, we (my wife and I) prefer using positive reinforcement — the reward. As its name implies, *Dollar$ for Good Grade$* is a program that automates the practice of giving a child a monetary reward for educational achievement.

Our children use *Dollar$ for Good Grade$* regularly. We have made it easily accessible by placing it on both the educational disk and the game disk. They are encouraged to use the program on any pretext.

I'm sure that most of you have children like ours, whose lifetime ambition is to collect every *He-Man* figure, *Barbie* doll, *G.I. Joe*, *My Little Pony*, *Star Wars* figure, *Care Bear* or sticker known to Saturday morning commercial television. When a new gimmick is advertised, one or more of our children want it.

Seizing the opportunity, we tell our children that the report card money will have to be used to purchase the new toy they just can't live without. So off he or she trots to the CoCo with the others close behind. Since this happens at least once a week, the idea of striving for better grades is reinforced on a regular basis.

Whether we parents use *Dollar$ for Good Grade$*, or one of our children use it, the format is the same. A menu is printed that asks for a name and the number of As, Bs, etc. Once you have answered each question, you are given the opportunity to make any necessary changes. This is accomplished by pressing the number corresponding to the item you want to modify. The old number will be erased, and the new one you type in will replace it. Once you have it correct, you can get a printed copy. (See Figure 1.)

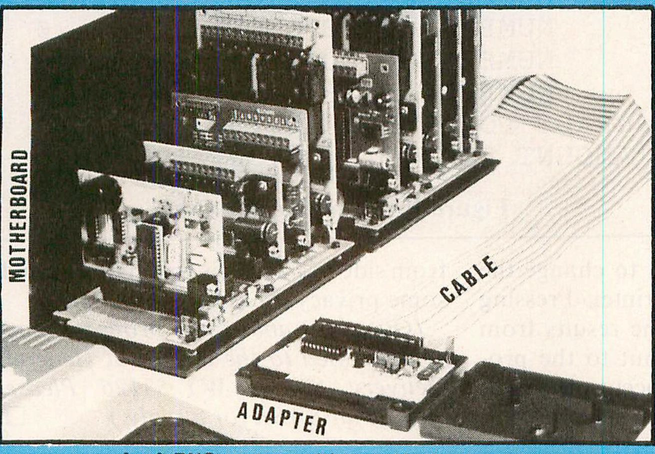
Dollar values have been arbitrarily assigned: $10 for a solid 'A' report card,

---

Dennis Dorrity is the author of several programs released through Color Connection Software and has been programming on the CoCo for about three years. He is a lieutenant in Quartermaster Corps, United States Army, and the father of two girls and two boys.

The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged *into* your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card **RE-140: $129**

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card **RE-156: $99**

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card **AD-142: $129**

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter **AN-146: $139**

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card **IN-141: $59**

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O **DG-148: $65**

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm **CL-144: $89**

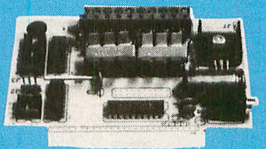
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

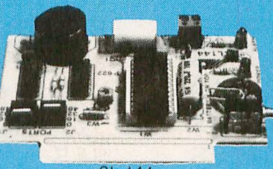
Touch Tone® Decoder **PH-145: $79**

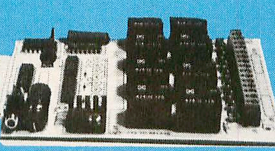
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card **PR-152: $15**

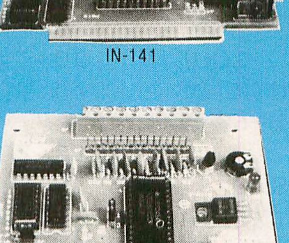
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s


ST-143


CL-144


RE-140

IN-141


AD-142

Smart Stepper Controller **SC-149: $299**

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). *Send for SC-149 flyer.*

Remote Control Keypad Option **RC-121: $49**
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option **PD-123: $89**
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option **BB-122: $19**
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver **ST-143: $79**

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).
Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors **MO-103: $15 or 4 for $39**

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot, Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) **CA-163: $24**

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.
Special cable for two A-BUS cards: **CA-162: $34**

A-BUS Motherboard **MB-120: $99**

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- **The A-BUS is not a replacement for the Multi-pak**

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT & NY residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

ALPHA Products
a Sigma Industries Company
242-W West Avenue, Darien, CT 06820

Technical info: (203) 656-1806
Orders only (Except in CT) **800 221-0916**
Connecticut orders: (203) 348-9436
All lines open weekdays 9 to 5 Eastern time

$7 for a 'B', $4 for a 'C', $1 for a 'D' and zero for an 'F'. In the program, a child also receives a $10 bonus for a straight 'A' report card for a total of $20. To some this may seem like a lot of money, but I have noticed a steady improvement in all of my children's report cards. In my mind, the money is well spent. However, you can change these values by editing Line 120. BN equals Bonus, SA equals straight 'A', SB equals Solid 'B', and so on.

Baud	Value
300	180
600	87
1200	41
1800	25
2400	18
3600	10
4800	7
7200	3
9600	1

Table 1

Line 100 sets the printer baud rate to 1200. You can delete the line if you use 600 baud, as this is the default for the CoCo. Or you can substitute one of the values from Table 1 for the 41 to change the baud rate to fit your printer. Pressing the letter P will print the results from the values you have input to the program. The printout will occupy the right half of the sheet. Fold the sheet in half, from side to side. This will give the child some privacy if needed.

```
       DOLLAR$ FOR GOOD GRADE$

NAME OF STUDENT: ANGELINA
   NUMBER OF 'A's OR 'VG's:  3
   NUMBER OF 'B's OR 'S+'s:  2
   NUMBER OF 'C's OR 'S's:   0
   NUMBER OF 'D's OR 'S-'s:  0
   NUMBER OF 'F's OR 'N's:   0
GRADE POINT AVERAGE: 3.60
AMOUNT EARNED:  $8.80
```

Figure 1: Sample Report Card

(Questions about this program may be addressed to the author at General Delivery, Smoot, WY 83126. Please include an SASE for a reply.) ☐

```
250 ......225
440 ......194
630 ......116
END .....123
```

The listing: GRADE$

```
10 '$$$$$$$$$$$$$$$$$$$$$$$$$$$
20 '$$       DOLLAR$ FOR      $$
30 '$$       GOOD GRADE$      $$
40 '$$  WRITTEN IN  1985 BY   $$
50 '$$   DENNIS O. DORRITY    $$
60 '$$$$$$$$$$$$$$$$$$$$$$$$$$$
70 '###########################
80 '## INITIALIZATION & MENU ##
90 '###########################
100 POKE150,41 '1200 BAUD
110 PG$="#.##":PM$="$$#.##":BL$=
STRING$(30,191) 'AESTHETIC VALUE
S
120 BN=10.00:SA=10.00:SB=7.00:SC
=4.00:SD=1.00:SF=0 'DOLLAR VALUE
S
130 CLS4:TL$=" DOLLAR$ FOR  GOOD
 GRADE$ ":FORL=1TO26:TL=ASC(MID$
(TL$,L,1)):IFTL>64THENTL=TL-64
140 POKE1026+L,TL:NEXTL
150 TL$=" WRITTEN BY DENNIS O. D
ORRITY ":FORL=1TO30:TL=ASC(MID$(
TL$,L,1)):IFTL>64THENTL=TL-64
160 POKE1504+L,TL:NEXTL
170 GOSUB520 'NAME
180 GOSUB540 'A OR VG
190 GOSUB550 'B OR S+
200 GOSUB560 'C OR S
210 GOSUB570 'D OR S-
220 GOSUB580 'F OR N
230 PRINT" 7. START OVER
240 PRINT" P. PRINT HARD COPY
250 '###########################
260 '## CALCULATION ROUTINES ##
270 '###########################
280 GA=(A*4)+(B*3)+(C*2)+D 'GRAD
E ADJUSTMENT
290 GV=(A*SA)+(B*SB)+(C*SC)+(D*S
D)+(F*SF) 'GRADE VALUATION
300 NC=A+B+C+D+F 'NUMBER OF CLAS
SES
310 IFNC=0THENPRINT@384:PRINT@41
7:GP=0:ME=0:GOTO340
320 GP=GA/NC 'CALCULATE GPA
330 ME=GV/NC 'MONEY EARNED
340 PRINT@384," A GRADE POINT AV
ERAGE OF ";:PRINTUSINGPG$;GP
350 PRINT:PRINT@417,"EARNS ";:PR
INTUSINGPM$;ME;
360 IFGP=4THENPRINT" + BONUS OF
";:PRINTUSINGPM$;BN
370 '####################
380 '## CHANGE ROUTINE ##
390 '####################
400 TL$=" ANY CHANGES? ENTER <1-
P> "
410 FORL=1TO26:TL=ASC(MID$(TL$,L
,1)):IFTL>64THENTL=TL-64
420 POKE1346+L,TL:NEXTL
430 AC$=INKEY$:IFAC$=""THEN430
440 PRINT@320,BL$; 'BLANKS OUT P
ROMPT
450 IFAC$="P"GOSUB620
460 AC=VAL(AC$):IFAC<1ORAC>7THEN
280
```

INTRODUCING THE NEXT GENERATION: CoCo Max™ III*

More Resolution · More Power · More Color · Built-in Animation · More Speed · More Type Styles · More Tools · Amazing Color Sequencing

"The best program ever written for the Color Computer"

That's how thousands of enthusiastic users rated the **CoCo Max II** drawing program. With **CoCo Max III** we are ready to amaze them again. Instead of "patching" CoCo Max II, we rewrote it from scratch to take advantage of the CoCo Max III hardware. The results will knock your socks off! Below is a brief list of some of the *new* features, but some, such as **animation, color sequencing**, or the **slide show**, have to be seen. Send for the Demo Disk, and see for yourself.

Everybody's favorite drawing package features:
- A 50% larger editing window. - Zoom area **400%** larger. - New drawing tools: **rays, 3D cubes, arcs**,... - New editing tools: shadow,text size,... - Rotate by 1.5° steps - Select any 16 of the 64 possible colors (all 64 colors displayed at once!) - Powerful **color mix**: additive, subtractive, overlay,... - Full **color editing** of patterns and color changing patterns. - Incredible **special effects** with **color cycling** up to 8 colors with variable speed. -**Animation** adds the dimension of motion to your image. (Must be seen.) - Sophisticated data compression saves up to 70% of disk space when saving pictures.

In addition, there are dozens of enhancements to the multitude of features that made CoCo Max II a best seller.

More about CoCo Max III

- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
- The new CoCo Max III **Hi-Res Interface** and the CoCo Max II **Hi-Res Pack** are *not* interchangable.
- The new interface plugs into the joystick connector.
- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures and fonts.

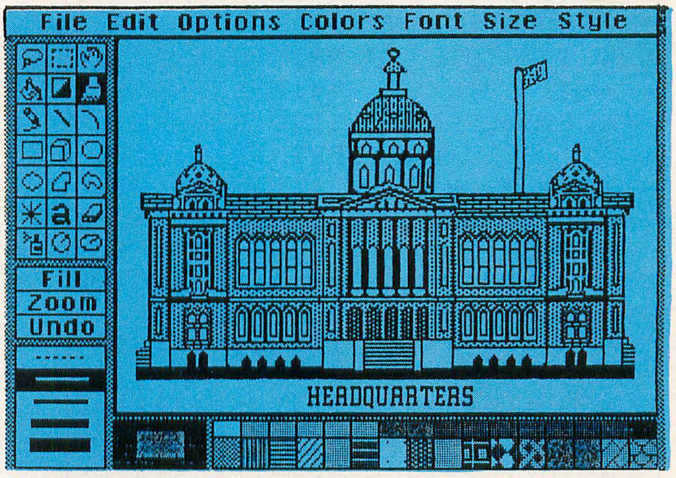
Note: CoCo Max II (for the CoCo 2) is still available on disk ($79.95). CoCo Max I is still available on tape ($69.95). For details, refer to our double page ad in any *Rainbow* from January '86 to July '87

Toll Free operators are for orders only. If you need precise answers, call the **tech line**. (Detailled CoCo Max specs are included with the Demo Disk.)

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

Technical info: (203) 656-1806
Orders only (Except in CT): **800 221-0916**
Connecticut orders: (203) 348-9436
All lines open weekdays 9 to 5 Eastern time

* Beware of cheap and inferior imitations that *DO NOT* include a Hi-Res Interface or charge extra for each utility.



Imagine this picture in sixteen colors!

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

System Requirements:
Any CoCo 3 disk system with a Joystick or a Mouse.
We apologize to tape users, CoCo Max III needs the flexibility of a disk.

The **CoCo Max III** system includes: ● The special Hi-Res interface (for your mouse or joystick) ● The CoCo Max III disk ● Many utilities: (To convert Max II pictures, Max II fonts, etc.) ● A detailled User's Manual. Complete system; nothing else to buy. **CoCo Max III: $79.95***

WITH COUPON ONLY

FREE DEMO DISK

Name
Street
City
State Zip
Printer used:

Please include $2 to help defray Processing and Shipping costs. (Check, Money Order, etc. Sorry, no COD or Credit Cards). Coupon (or copy) must be mailled to:

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A division of Sigma Industries, Inc.

COLORWARE
242-W West Avenue
Darien, CT 06820

```
470 ON AC GOSUB 520,540,550,560,
570,580,130
480 GOTO280 'RECALC GPA & $$
490 '##########################
500 '## INPUT SUB-ROUTINES ##
510 '##########################
520 PRINT@64:PRINT@65,"1. NAME?
";:LINEINPUTSN$
530 IFLEN(SN$)<1ORLEN(SN$)>15THE
N520ELSERETURN
540 PRINT@96:PRINT@97,"2. HOW MA
NY A OR VG? ";:LINEINPUT A$:A=VA
L(A$):PRINT@117,A:RETURN
550 PRINT@128:PRINT@129,"3. HOW
MANY B OR S+? ";:LINEINPUT B$:B=
VAL(B$):PRINT@149,B:RETURN
560 PRINT@160:PRINT@161,"4. HOW
MANY C OR S?  ";:LINEINPUTC$:C=V
AL(C$):PRINT@181,C:RETURN
570 PRINT@192:PRINT@193,"5. HOW
MANY D OR S-? ";:LINEINPUTD$:D=V
AL(D$):PRINT@213,D:RETURN
580 PRINT@224:PRINT@225,"6. HOW
MANY F OR N?  ";:LINEINPUTF$:F=V
AL(F$):PRINT@245,F:RETURN
590 '######################
600 '## PRINTER ROUTINE ##
610 '######################
620 IF(PEEK(65314)AND1)<>1THEN65
0 'DETERMINES PRINTER STATUS
630 PRINT@325," PRINTER IS NOT R
EADY ";
640 FORL=0TO999:NEXTL:RETURN
650 PRINT#-2,TAB(50)"DOLLAR$ FOR
 GOOD GRADE$
660 PRINT#-2:PRINT#-2,TAB(44)"NA
ME OF STUDENT: "SN$
670 PRINT#-2,TAB(48)"NUMBER OF '
A's OR 'VG's: "A
680 PRINT#-2,TAB(48)"NUMBER OF '
B's OR 'S+'s: "B
690 PRINT#-2,TAB(48)"NUMBER OF '
C's OR 'S's:  "C
700 PRINT#-2,TAB(48)"NUMBER OF '
D's OR 'S-'s: "D
710 PRINT#-2,TAB(48)"NUMBER OF '
F's OR 'N's:  "F
720 PRINT#-2,TAB(44)"GRADE POINT
 AVERAGE: ";:PRINT#-2,USINGPG$;G
P
730 PRINT#-2,TAB(44)"AMOUNT EARN
ED: ";:PRINT#-2,USINGPM$;ME
740 IFGP=4THENPRINT#-2,TAB(56)"
+ ";ELSE780
750 PRINT#-2,USINGPM$;BN;:PRINT#
-2," BONUS
760 PRINT#-2,TAB(59)"------
770 PRINT#-2,TAB(59);:PRINT#-2,U
SINGPM$;ME+BN
780 FORL=1TO5:PRINT#-2:NEXTL
790 RETURN
```

PRINTERS!

NEW! Okidata 192+ (Par. or Ser.)	$370
NEW! Okidata 193 (Parallel)	$540
NEW! Okidata 193+ (Serial)	$610
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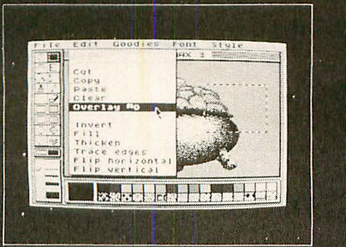
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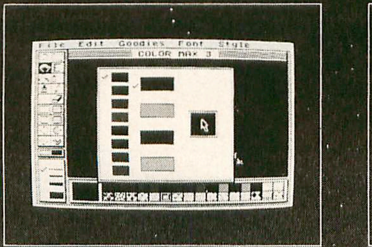
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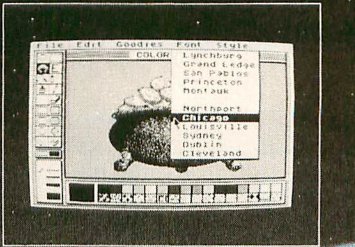
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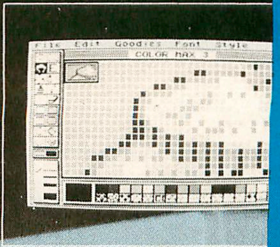
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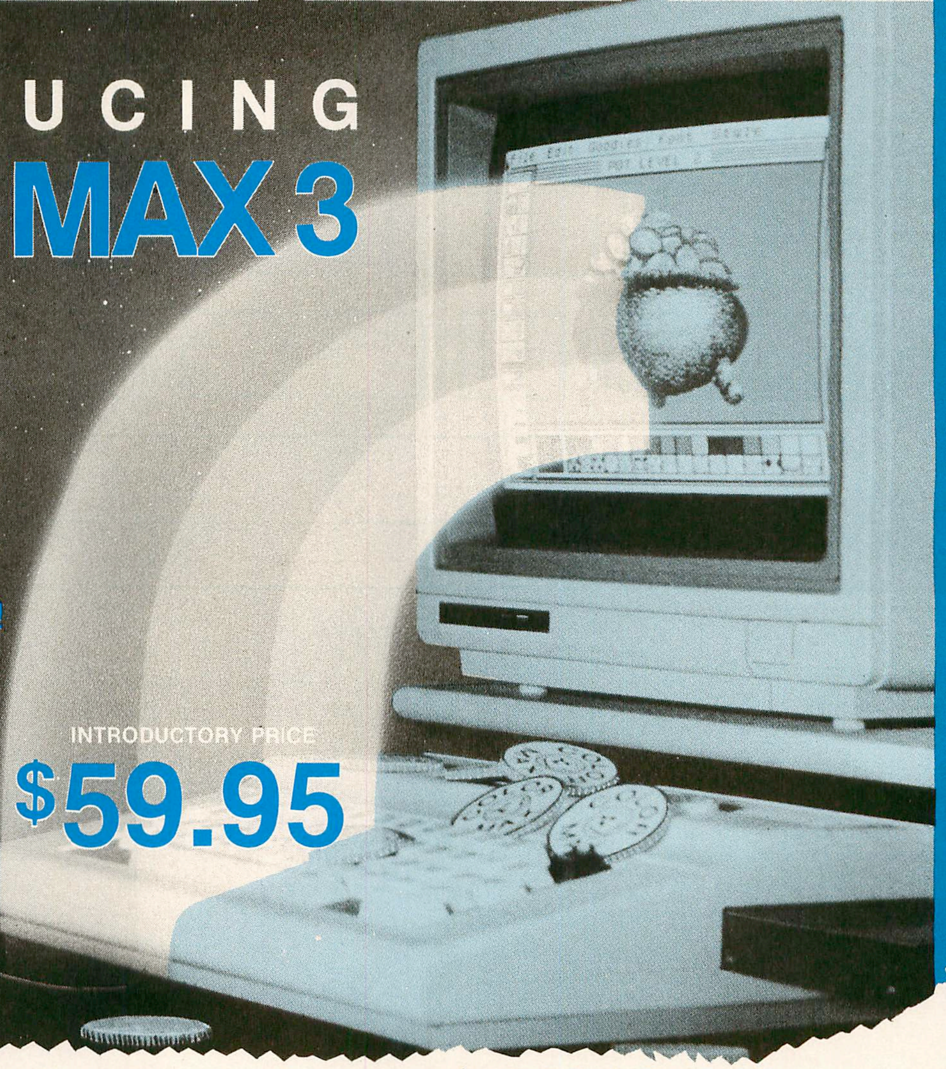
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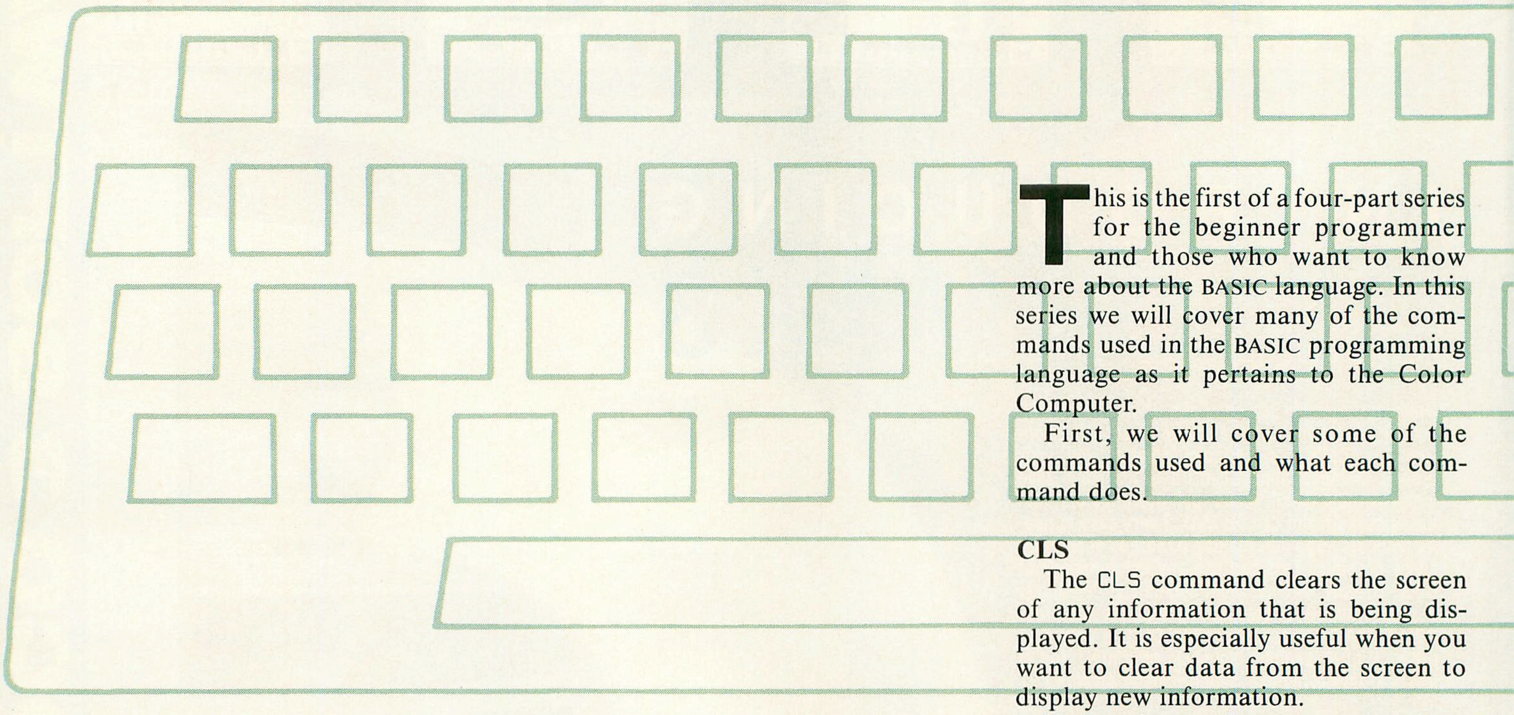

BASIC for Beginners

Lesson 1

By David W. Ostler

This is the first of a four-part series for the beginner programmer and those who want to know more about the BASIC language. In this series we will cover many of the commands used in the BASIC programming language as it pertains to the Color Computer.

First, we will cover some of the commands used and what each command does.

CLS

The `CLS` command clears the screen of any information that is being displayed. It is especially useful when you want to clear data from the screen to display new information.

Various forms of `CLS` are `CLS`*x*, where *x* is a number value between 0 to 8. The number will set the color of the screen. But when typing or printing of data onscreen occurs, the data will still appear black on a light green screen. If no number follows the `CLS` command, the screen will remain light green but all data will be removed from the screen display.

Table 1 shows the color that will be displayed with the value of *x*.

Table 1

X	Color
=	=====
0	Black
1	Green
2	Yellow
3	Blue
4	Red
5	Buff (Off-White)
6	Cyan (Blue-Green)
7	Magenta (Purple)
8	Orange

Dave Ostler is an IC layout designer and the systems manager for a CAD mainframe system. He teaches CAD and electronics at Gailford Technical Community College. Dave is married and has three children, Avis, Chuck and Erik.

Try this on your computer. Enter the CLS command and add a number directly behind it. Remember that the syntax (the way that the command has to be for the computer to recognize it) has to be correct. (Example: CLS0, CLS1, CLS2, CLS3, CLS4, CLS5, CLS6, CLS7, CLS8, CLS.)

Enter Listing 1 to see what types of screens your computer can generate by using the CLS command.

INPUT

The INPUT command allows you to enter variables into the program. These variables may be string variables (a$, A$, c$, CS$, etc.) or integer variables (a, A, B, d, AE, etc.). This command is used where more than one character needs to be entered as a variable or can be used as a place to pause a program. Please note that this command will not allow entry of any punctuation such as commas, periods, colons or semicolons.

Proper syntax for this command is INPUT;*x*, INPUT"ENTER YOUR NUMBER HERE";*x*, for integer variables or INPUT"ENTER YOUR TEXT HERE";*x*$ for string variables.

Other commands that also allow variable entry are LINEINPUT and INKEY$. These commands will be covered later in this series.

PRINT

The PRINT command allows printing of variables and text strings or forces the cursor down the screen for proper screen printing. This command can also send information to various devices that are connected to your computer via the RS-232 (Serial I/O) plug or to the disk via the disk controller.

It can also be combined with other characters to print, to the screen or to the devices mentioned above, in a particular way.

The proper syntax for this command is PRINT, PRINT"THIS STRING ON THE SCREEN" or PRINT*xxx*, where *xxx* is a specifier of where to send the data or how to print the data when it is sent. Table 2 covers some of the specifiers and their use; for more information, refer to your manual on the PRINT command and its various forms.

Of course, there are variations of these commands and other commands not covered here. Refer to your manual for more information on variations and their uses.

Table 2

Specifier	Use
=======	===
PRINT#-1	Sends data to the tape drive
PRINT#-2	Sends data to the printer
PRINT@XXX	Prints data at a particular place on the screen
PRINTTAB	Moves the cursor to the tab location
PRINTUSING	Prints data in a specified format.

FOR/NEXT

The FOR/NEXT command can be used to set up a delay or force looping for data calculation or conversion.

Loops are classified as two types: conditional and unconditional. Conditional loops have, just like the phrase says, conditions that must be met for the loop to continue and go on to the rest of the program. Unconditional loops will loop and go on to the rest of the program no matter what. The FOR/NEXT commands used in the programs

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for this part of the series are conditional. They are used to put timing delays into the programs.

The proper syntax for this command is FOR *x* = *a* to *b* STEP *c*:NEXT *x*, where *x* is the variable dependent upon the loop, *a* is the value (which can be constant or variable) that determines the starting point of the loop, *b* is a value (which can also be a constant of a variable) that determines the end point of the loop, and *c* tells the computer how many value units to count before checking the loop. The NEXT *x* statement forces the loop back to the count. When the count is equal to the value of *b*, the program will proceed out of the loop.

INKEY$

The INKEY$ command questions the keyboard for keystrokes, then checks them against the conditional loops set up within the program to see if the conditions are satisfied. Or it can be used with other commands to pause the program or select values. One use that most of us are familiar with is "PRESS ANY KEY TO CONTINUE".

The proper syntax for this command is A$=INKEY$, where A$ is the variable string selected to be intrepreted by the INKEY$ command.

END

This command marks the ending point of the program. When the END command is acted upon, the program terminates and you are placed back into the BASIC operating system.

The proper syntax for this command is END. This command requires no variables or other conditions for the command to be executed.

Variable Explanation

This is a numerical value or text string, which can change within the program to allow entry of desired information. This information can be generated within the program or entered by the keyboard. This information may then be manipulated to return values or data information. Examples of variables are found in the listings.

Looking at Listing 1

Line 10 clears the screen, moves the cursor down the screen two lines and prints the text "THIS IS A CLS COMMAND".

Line 20 sets up a timing delay so that the screen will not flash on to the next screen before you have a chance to observe it. Please note that the loop will count from 1 to 1000, and count by ones, before the program will proceed. The NEXTx command tells the program that the count has been registered and to continue counting to 1000.

Lines 30 through 180 perform the same functions as those described above, but the CLS command has the values attached to it, so that will change the screen as directed. (As an example, Line 30 prints the text "THIS IS A 'CLS 1' COMMAND"; Line 40, a NEXTx command; Line 50 prints "THIS IS A 'CLS 2' COMMAND"; Line 60, a NEXTx command; and so on.)

> ***"Integer variables will not allow any entry other than numbers."***

Line 190 clears the screen, moves the cursor down the screen by two lines and prints the text "THIS DEMO SHOWS THE 'CLS' COMMAND IF YOU WISH TO SEE THIS DEMO AGAIN PRESS (A) ELSE ANY OTHER KEY TO END THIS PROGRAM".

Line 200 sets string variable A$ so that the keyboard will set A$ equal to the the key pressed.

Line 210 tests string variable A$ and checks to see if any key has been pressed; if no key has been pressed, then the program will loop back to Line 200. If a key has been pressed, then the program will proceed to the next program step. This is a conditional loop.

Line 220 tests string variable A$ to see if the key pressed was the A key. If the A key is pressed, the program is forced back to Line 10 to start the program again at that point. If the key pressed is not the A key, the program will then proceed on to the next program step.

Line 240 clears the screen and then ends the program.

Looking at Listing 2

Line 10 clears the screen, moves the cursor down the screen one line and then prints the text "ENTER YOUR NAME". It also allows the entry of string variable A$ from the keyboard. Note: The INPUT command will not allow entry of variables with any form of punctuation.

Line 20 moves the cursor down the screen two more lines and then allows the entry of integer variable A. Note: Integer variables also will not allow any entry other than numbers, any other type of notation such as commas for thousands or dollar signs to indicate dollars. It will allow the entry of periods. Periods are treated as decimal points.

Line 30 clears the screen, moves the cursor down the screen two lines and prints the text "WORKING . . . . .".

Line 40 does the mathematical manipulation of integer variable A (subtracts the integer variable A from 87) and sets integer variable B equal to that manipulation. It then sets up a timing delay to simulate that the computer is working on the problem. Please note that the loop will count from 1 to 1000, and count by ones, before the program will proceed. The NEXTx command tells the program that the count has been registered and to continue counting to 1000.

Line 50 clears the screen, prints string variable A$ (your name entered in Line 10), directly following it prints the text string "YOU ARE", directly following it prints integer variable B, and directly following that the text string "YEARS OLD". So the entire line reads "*your name* YOU ARE 35 YEARS OLD".

Line 60 moves the cursor down the screen two lines and prints the text "ANOTHER (Y/N)".

Line 70 sets string variable B$ so that the keyboard will set string variable B$ equal to the the key pressed. It then tests string variable B$ and checks to see if any key has been pressed; if no key has been pressed, then the program will loop back to Line 70. If a key has been pressed, then the program will proceed to the next program step.

Line 80 tests string variable B$ to see if the key pressed was the Y key. If the Y key is pressed, the program is forced back to Line 10 to start the program again at that point. If the Y key is not the key pressed, then the program will proceed to the next program step.

Line 90 tests string variable B$ to see if the key pressed was the N key. If the N key is pressed, the program is forced to Line 110 to end the program. If the N key is not the key pressed, then the program will proceed on to the next program step.

Line 100 forces the program to go back to Line 70 (this is an unconditional loop). This loop ensures that only the Y and N keys are able to control the program action. Any other keys cause the program to go back to the INKEY$ routine in Line 70.

Line 110 clears the screen and forces the program to terminate and place control back into the BASIC operating system.

PROGRAMMING EXERCISES

Exercise 1

Utilizing the methods presented in listings 1 and 2, write a program that will take any number you enter as a variable and multiply that number by 2.

Note: The figure that your computer uses for multiplication is the asterisk (*). Example: 4 x 3 = 12 is how we would write it on paper. 4 * 3 = 12 is how the computer needs it.

Exercise 2

Write a program that will allow you to enter your name, street address, city, state, ZIP and phone number as different string variables.

Variables can be any two-character combination. You can use any number of variables within a program in any combination of numerical and/or alpha characters. The only limitation is that you may run out of memory in the computer if you use too many.

The solutions to the programming exercises will be printed in the next installment of this series. Note that there may be many different ways in programming to obtain the same result; in this series we will attempt to use the most straightforward method for simplification.

(Questions about this tutorial may be directed to the author at 901 Ferndale Blvd., High Point, NC 27260. Please enclose an SASE when writing.) ☐

Listing 1: CLS

```
10 CLS:PRINT:PRINT"     THIS IS A
 'CLS' COMMAND"
20 FORX=1TO1000STEP1:NEXTX
30 CLS1:PRINT:PRINT"     THIS IS
A 'CLS1' COMMAND"
40 FORX=1TO1000STEP1:NEXTX
50 CLS2:PRINT:PRINT"     THIS IS
A 'CLS2' COMMAND"
60 FORX=1TO1000STEP1:NEXTX
70 CLS3:PRINT:PRINT"     THIS IS
A 'CLS3' COMMAND"
80 FORX=1TO1000STEP1:NEXTX
90 CLS4:PRINT:PRINT"     THIS IS
A 'CLS4' COMMAND"
100 FORX=1TO1000STEP1:NEXTX
110 CLS5:PRINT:PRINT"     THIS IS
 A 'CLS5' COMMAND"
120 FORX=1TO1000STEP1:NEXTX
130 CLS6:PRINT:PRINT"     THIS IS
 A 'CLS6' COMMAND"
140 FORX=1TO1000STEP1:NEXTX
150 CLS7:PRINT:PRINT"     THIS IS
 A 'CLS7' COMMAND"
160 FORX=1TO1000STEP1:NEXTX
170 CLS8:PRINT:PRINT"     THIS IS
 A 'CLS8' COMMAND"
180 FORX=1TO1000STEP1:NEXTX
190 CLS:PRINT:PRINT" THIS DEMO S
HOWS THE 'CLS' COM-   MAND IF YO
U WISH TO SEE THIS    DEMO AGAIN
 PRESS (A) ELSE ANY    OTHER KEY
 TO END THIS PROGRAM"
200 A$=INKEY$
210 IFA$=""THEN 200
220 IFA$="A"THEN 10
240 CLS:END
```

Listing 2: VARIABLE

```
10 CLS : PRINT : INPUT "ENTER YO
UR NAME";A$
20 PRINT : INPUT "ENTER YEAR OF
YOUR BIRTH";A
30 CLS : PRINT : PRINT "WORKING.
......."
40 B=(87-A) : FOR X = 1 TO1000 S
TEP 1 : NEXT X
50 CLS : PRINT : PRINT A$ ;: PRI
NT " YOU ARE "; B ;: PRINT "YEAR
S OLD"
60 PRINT : PRINT "ANOTHER (Y/N)"
70 B$=INKEY$ : IF B$ = "" THEN 7
0
80 IF B$ = "Y" THEN 10
90 IF B$ = "N" THEN 110
100 GOTO 70
110 CLS : END
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Learning Readiness and Computers

By Michael Plog, Ph.D.
Rainbow Contributing Editor

As you read this September issue, schools across the country are finishing preparations for the new school year. Some teachers have already been in their buildings, getting materials ready for new students. Soon, students will invade *your* school, ready for classes, textbooks, note pads and keyboards.

Or will they be ready? Educators use the term "readiness" to describe a condition of students when learning is most effective. If students are not "ready," teaching is difficult, perhaps impossible as a meaningful experience. When children *are* ready, teaching is easier, learning is more efficient, and students are more willing to participate in the activities required by the teacher.

The concept of readiness is normally used more with the areas of reading and mathematics, but it applies to all fields of learning. It can be applied to computer education as well as other areas of knowledge. Learning theorists have identified four components of readiness: physical, emotional and social, mental and educational.

Mental readiness is generally related to the intellectual level of the student, sometimes measured by IQ scores. We can dispense rather quickly with mental readiness, as far as computer education goes. This component of readiness is very important for other areas of learning, especially for classification of students with learning disabilities. For our purposes, however, we can assume that any child in a regular education class (and many in special education classes as well) has an intelligence level sufficient for the tasks required.

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.

In addition, there is very little we can do about a child's level of mental abilities. Some experiments have been conducted that show promise for improving intellectual abilities, but to date there is no "cure" for such difficulties. Even the experiments have conflicting results, seeming to work well in some situations and for some children and not so well in other situations and for other children.

Likewise, physical readiness is not generally a problem with computer education. I have seen one-handed typists operate a keyboard very well, with only one problem — holding the CTRL key down while pressing another key. Some of these typists use a device made from a clothespin to hold the CTRL key and hardly skip a beat when typing. I also know a blind programmer. He uses a device that allows him to "read" computer printout and make changes and corrections, then he instructs a keypuncher to take the next steps.

For most physically handicapped students, solving the difficulties of computer education are small compared to the difficulties faced by other parts of the school setting, such as trying to get a wheelchair into a restroom. Physical readiness is simply something that is only important for computer education in an extremely small number of cases. We can set that aside as a major consideration of readiness.

Now comes emotional and social readiness. Educators of primary students are often faced with this situation. Children come to school and are still very dependent on parents or older siblings. The personal adjustment of some children is such that a lack of self-security interferes with learning. This is especially evident in such fundamental areas as reading, where students have too little self-esteem to face mistakes.

When applied to the field of computer education, the problem can become enormous. Students are faced with an entirely new situation, a new set of rules to govern their learning. This can generate enough fear to immobilize students and cause a distaste for computers. This reaction may be especially noticeable in bright students. Teachers know the students can do the work, can understand the concepts involved and should have no difficulty. However, fear blocks effective learning.

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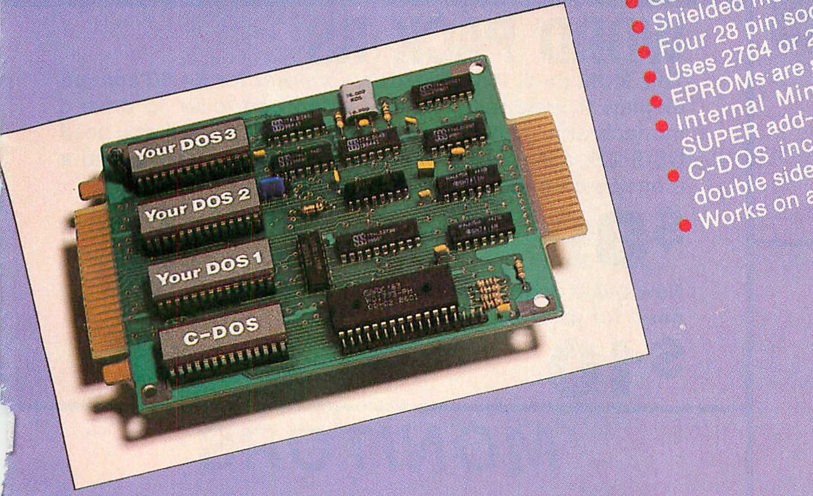

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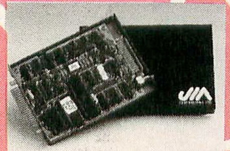

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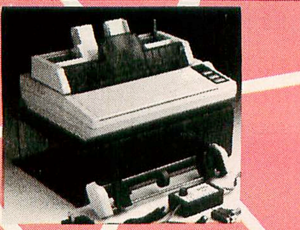

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they know they should learn more about computers, but have an irrational fear of them. These people know the fear is irrational, yet cannot set it aside.

Some students are not "ready" — because of emotional or social factors — to learn about computers. Reading teachers and special education teachers have the jump on computer educators in this area. There are techniques used to improve emotional and social readiness. Most of these techniques use the subject matter (reading or mathematics, normally) to improve the self-image and personal adjustment of the student.

Teachers involved with computers should be aware that such a lack of readiness might be the cause of some students not learning what is expected. I know of no simple cure for this lack of readiness, but I am sure that competent teachers can develop techniques to assist those students with this problem.

The major problem of readiness comes in the area of educational readiness. Some components of this type of readiness include ability to attend to tasks, the extent of vocabulary (especially for reading) and the background of understanding. If students are simply not able to attend to computer learning long enough to accomplish the objectives, they will not learn a sufficient amount. Also, the concept of preconditions to learning become important here. It is difficult to teach BASIC programming without a rather firm understanding of simple mathematics. It is difficult to teach word processing without a strong reading basis. Students need to have a background of understanding and an adequate vocabulary to comprehend what is happening with the computer.

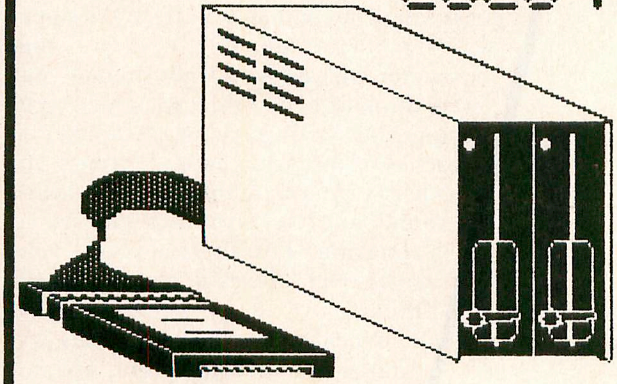
Fortunately, educators have a great deal of control over the factors of educational readiness. Teachers can structure a study of computers with those factors in mind. We can learn where the student is, then fashion a course of study to lead the student from the current educational level to a higher one. Students can learn vocabulary as part of the course of study. In fact, these factors of educational readiness are what generally make a curriculum.

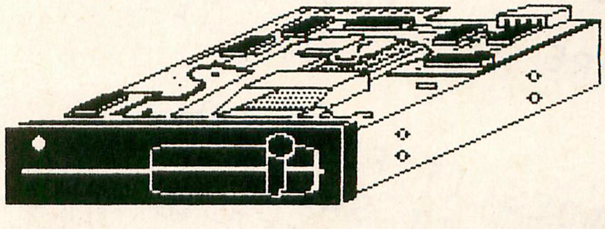
Theorists have several additional factors to the educational component of readiness, two that we will discuss here: an understanding of the subject's importance and a desire to learn. These two factors are probably the most important considerations when dealing with readiness for computer education. The two are not the same. Students may understand the importance of a subject (especially knowledge of computers) and yet have no desire to learn. Also, students may have a desire to learn something simply because it is fun, yet have no concept of why the subject is important. Of the two, desire to learn seems more crucial to readiness than an understanding of the subject's importance. Maybe the definition of a good teacher is one who causes students to have a desire to learn the subject.

Schools face a continuing problem in all subject areas of the discrepancy between student readiness to learn and the need of the student to learn. Our culture can no longer afford students who are computer illiterate. Thus, students have a need for acquisition of knowledge about computers — whether or not they are ready for it! The task of educators is then to improve the readiness of students to learn about computers. Are we "ready" for this task?

Any comments, suggestions or thoughts are welcome. Please contact me at 829 Evergreen, Chatham, IL 62629.

COCO ACCESSORIES





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ARTIFICIAL INTELLIGENCE

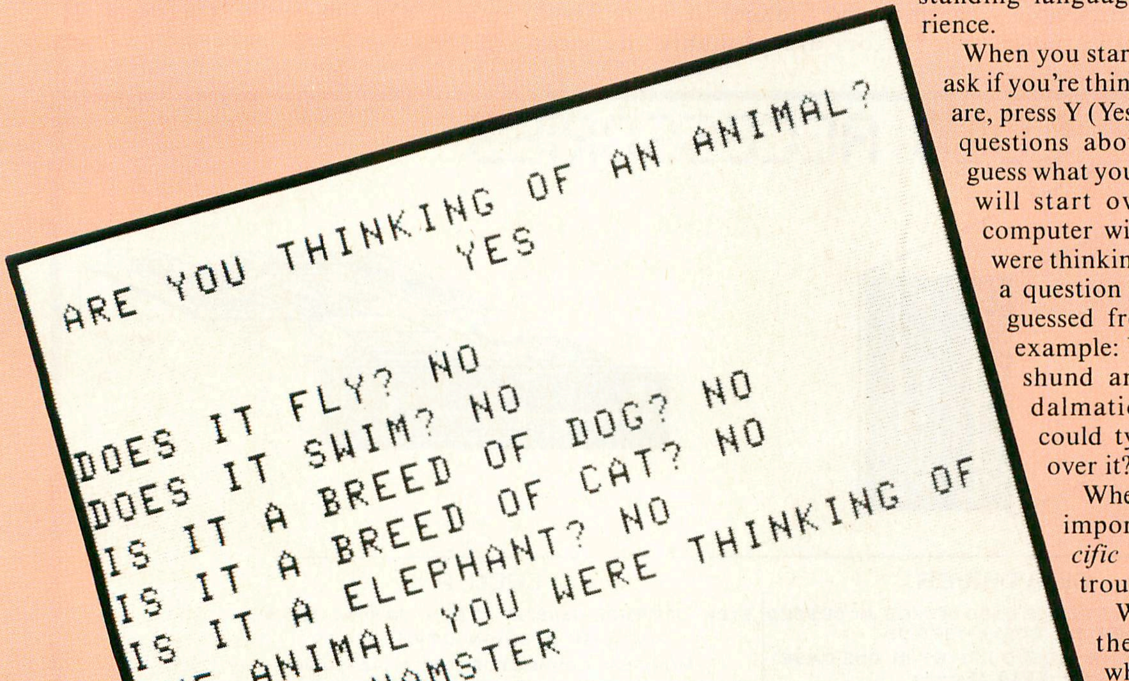
16K ECB

A building block for thought, creativity, imagination and language

The Power of the Mind

By Andy Blount

One of the fun things about using a computer is teaching it to learn. That's why I wrote *Animals*, a game that illustrates concepts used in artificial intelligence. *Animals* simulates the human mind by causing the computer to perform functions that are normally associated with human intelligence — recognizing objects, making decisions, drawing conclusions, understanding language and learning from experience.



```
ARE YOU THINKING OF AN ANIMAL?
          YES

DOES IT FLY? NO
DOES IT SWIM? NO
IS IT A BREED OF DOG? NO
IS IT A BREED OF CAT? NO
IS IT A ELEPHANT? NO
THE ANIMAL YOU WERE THINKING OF
WAS A ? HAMSTER
```

When you start *Animals*, the computer will ask if you're thinking of an animal. When you are, press Y (Yes). The computer will ask you questions about your animal and finally guess what your animal is. If right, the game will start over; but if it's wrong, the computer will ask you what animal you were thinking of and then ask you to type a question distinguishing the animal it guessed from your animal. Here's an example: You were thinking of a dachshund and the computer guessed a dalmation. For the question, you could type, "Does it have spots all over it?"

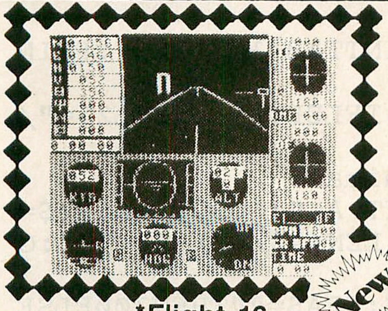
When you're playing *Animals*, it's important that you think of *specific* animals, such as a rainbow trout rather than just a fish.

When you are ready to quit the game, just press N (No) when asked if you are thinking of an animal. You'll then be able to save your collection of questions and animals on disk or cassette. The game will hold up to 300 animals and questions.

(Questions about this program may be addressed to the author at 339 32 1/2 Rd., Palisade, CO 81526. Please enclose an SASE when writing for a reply.) □

Andy Blount lives near the small towns of Palisade and Grand Junction in Colorado. He is 14 years old and enjoys programming on his Color Computer.

TOM MIX'S MINI-CATALOG



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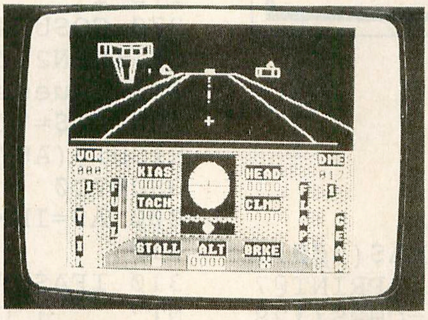
32K for Printer Output
Specify Tape or Disk

Fractions—A Three-Program Package. 1/Mixed & Improper 2/Equivalence 3/Lowest Terms. Practice, review and definitions make learning easy.

32K Ext. Basic $35.95
Specify Tape or Disk

FLIGHTS



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*COCO 3 Compatible

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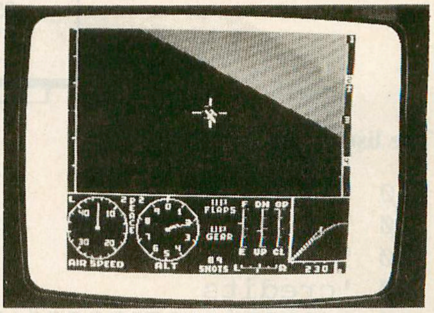

*P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of *this program*). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations against another player, OR a non combatant computer drone.

32K Machine Language
Joysticks Required $34.95
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Here's the quality you've come to expect from TOM MIX. Endless possibilities await you in this exciting new creation. Move over Goldrunner and Loderunner, here comes GOLDFINDER . . .

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Disk

*Approach Control Simulator

A complete simulation package which will lead to countless hours of discovery and adventure.

- Specify Disk or Tape
- Quick Reference Guide
- Comprehensive Manual
- No Joysticks Required

32K Machine Language $34.95

*Trapfall

The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K Machine Language $23.95
Specify Tape or Disk

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```
140 ......106
280 .......40
440 ......254
650 ......107
END .....186
```

The listing: ANIMALS

```
10 'ANIMALS
20 'BY ANDY BLOUNT
30 '
40 'credits
50 PCLEAR1:CLEAR5000:DIMA$(300):
CLS0:PRINT@13,"ANIMALS";:PRINT@7
4,"BY ANDY BLOUNT";:AA$=CHR$(128
)+CHR$(147):BB$=CHR$(128)+CHR$(1
57)+CHR$(157)+CHR$(152):FORX=162
TO190:PRINT@X,AA$;:PRINT@X+30,BB
$;:PLAY"L32O1CD":NEXT
60 PLAY"O4CABP20CABP20CAB":FORX=
1TO1000:NEXT:X=0
70 'load file
80 CLS:PRINT"DO YOU WISH TO LOAD
 AN ANIMAL   FILE?"
90 A$=INKEY$:IFA$=""THEN90ELSEIF
A$="Y" THEN100ELSE180
100 CLS:PRINT"WHICH DO YOU WANT
TO LOAD        ANIMALS OFF OF:",,
"1. DISK",,"2. CASSETTE"
110 ONVAL(INKEY$) GOTO120,130:GO
TO110
120 CLS:PRINT"INSERT DISK WITH '
ANIMAL/DAT' ONIT AND PRESS [ENTE
R]":EXEC44539:SF=1:GOTO140
130 CLS:PRINT"POSITION TAPE - PR
ESS <PLAY>    THEN PRESS [ENTER]
 WHEN READY":EXEC44539:SF=-1
140 OPEN"I",SF,"ANIMAL"
150 IF EOF(SF) THENCLOSE#SF:GOTO
170
160 INPUT#SF,A$(X):X=X+1:GOTO150
170 PRINT"DONE LOADING ANIMALS":
FORX=1TO1000:NEXT:GOTO200
180 FORX=0TO3:READA$(X):NEXT
190 'start game
200 CLS:PRINT@12,"LETS PLAY":PRI
NT@40,"'GUESS THE ANIMAL'":PRINT
210 PRINT"     THINK OF AN ANIMA
L AND I          WILL TRY TO GUE
SS IT.":T=1:N=VAL(A$(0))
220 IFT=0 THEN CLS
230 T=0:PRINT:PI$=" ARE YOU THIN
KING OF AN ANIMAL?":GOSUB710
240 A$=INKEY$:IFA$=""THEN240ELSE
IFA$="L" THEN250 ELSEIFA$="N" TH
EN730 ELSEIFA$="Y"THEN260 ELSE24
0
250 PRINT:PRINTTAB(13)"LIST":GOT
O650
260 PRINT:PRINTTAB(15)"YES":PRIN
T:B=1
270 GOSUB490:IFLEFT$(A$(B),2)="/
Q" THEN270
280 'guess animal
290 PI$="IS IT A ":GOSUB710:PI$=
RIGHT$(A$(B),LEN(A$(B))-2)+"?":G
OSUB710
300 A$=INKEY$:IFA$=""THEN300ELSE
310
310 IFA$="Y" THENPRINT" YES":PRI
NT"    I GUESSED IT! WHY NOT TRY
            ANOTHER ANIMAL." ELS
E330
320 FORZ=1TO1000:NEXT:GOTO220
330 PRINT" NO":INPUT"THE ANIMAL
YOU WERE THINKING OF WAS A ";V$
340 PRINT"ENTERING THE ANIMAL: "
V$:FORCC=1TO300:IFLEFT$(A$(CC),2
)<>"/A" THENNEXTCC ELSEFORZ=3TO
LEN(A$(CC)):IFMID$(A$(CC),Z,1)="
/" THENNEXTZ ELSE CC$=CC$+MID$(A
$(CC),Z,1):NEXTZ:IFV$=CC$ THEN36
0 ELSECC$="":NEXTCC
350 GOTO370
360 PI$="SORRY, I ALREADY KNOW A
":GOSUB710:PRINT:PI$=V$+", YOU M
UST HAVE":GOSUB710:PRINT:PI$="AN
SWERED A QUESTION WRONG. WHY  NO
T TRY AGAIN.":GOSUB710:FORX=1TO3
000:NEXT:GOTO220
370 PRINT"PLEASE TYPE A QUESTION
 THAT       WOULD DISTINGUISH A "V
$:PRINT"FROM A ";RIGHT$(A$(B),LE
N(A$(B))-2);":":LINEINPUT"";X$
380 PRINT"FOR A "V$",":LINEINPUT
"THE ANSWER WOULD BE: ";A$
390 A$=LEFT$(A$,1):IFA$<>"Y" AND
 A$<>"N" THEN380
400 IFA$="Y" THENB$="N"
410 IFA$="N" THENB$="Y"
420 D=VAL(A$(0))
430 A$(0)=STR$(D+2)
440 A$(D)=A$(B)
450 A$(D+1)="/A"+V$
460 A$(B)="/Q"+X$+"/"+A$+STR$(D+
1)+"/"+B$+STR$(D)+"/"
470 GOTO220
480 'ask questions
490 Q$=A$(B)
500 FORZ=3TO LEN(Q$)
510 IFMID$(Q$,Z,1)<>"/" THENPRIN
```

```
TMID$(Q$,Z,1);:NEXTZ
520 PRINT"?";
530 C$=INKEY$:IFC$=""THEN530ELSE
IFC$="Y" THENPRINT" YES" ELSEIFC
$="N" THENPRINT" NO" ELSE530
540 T$="/"+C$
550 FORX=3 TO LEN(Q$)-1
560 IFMID$(Q$,X,2)=T$ THEN580
570 NEXTX
580 FORY=X+1 TO LEN(Q$)
590 IFMID$(Q$,Y,1)="/"THEN610
600 NEXTY
610 B=VAL(MID$(Q$,X+2,Y-X-2))
620 RETURN
630 DATA"4","/QDOES IT FLY/Y2/N3
/","/ACROW","/AGOLD FISH"
640 'list animals
650 PRINT:PRINT"ANIMALS I ALREAD
Y KNOW ARE:"
660 FORI=1TO299:IFLEFT$(A$(I),2)
<>"/A" THENNEXTI:GOTO690
670 FORZ=3TO LEN(A$(I)):IFMID$(A
$(I),Z,1)<>"/" THENPRINTMID$(A$(
I),Z,1);:NEXTZ
680 PRINT,;:NEXTI
690 FORX=1TO1000:NEXT:GOTO220
700 'slow printing
710 FORYP=1TOLEN(PI$):PRINTMID$(
PI$,YP,1);:FORGH=1TO4:NEXTGH,YP:
RETURN
720 'saving animals & quiting
730 CLS:PRINT,,:PI$=" ARE YOU SU
RE YOU WANT TO QUIT?":GOSUB710
740 A$=INKEY$:IFA$=""THEN740 ELS
EIFA$="Y" THEN750 ELSEIFA$="N" T
HEN220 ELSE740
750 CLS:PI$="DO YOU WISH TO SAVE
 THE ANIMALS AND QUESTIONS IN ME
MORY TO DISK OR CASSETTE?":GOSUB
710
760 A$=INKEY$:IFA$=""THEN760ELSE
IFA$="N" THENCLS:END ELSEIFA$="Y
" THEN770 ELSE760
770 CLS:PRINT"WHICH DO YOU WANT
TO SAVE THEM  TO?",,"1. DISK",,"
2. CASSETTE"
780 ONVAL(INKEY$)GOTO 790,800:GO
TO780
790 CLS:PRINT"INSERT DISK TO SAV
E ANIMALS ON  THEN PRESS [ENTER]
":SF=1:EXEC44539:GOTO810
800 CLS:PRINT"POSITION TAPE - PR
ESS PLAY AND  RECORD THEN PRESS
[ENTER]":SF=-1:EXEC44539
810 OPEN"O",#SF,"ANIMAL":FORX=0T
O300:PRINT#SF,A$(X):NEXT:CLOSE#S
F:PRINT"FINISHED":FORX=1TO1000:N
EXT:CLS:END
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

"I cannot imagine the CoCo 3 without ADOS-3; it would not be a complete machine."
The RAINBOW, July 1987

You've moved up to a CoCo 3. A powerful new machine. Now, it's time to give BASIC a shot in the arm, with ADOS-3. Wouldn't it be nice to turn on your machine and be greeted by an 80-column display, in the colors of your choice, with your own custom startup message? To run routinely at 2 MHz (double speed) without having to slow down for disk and printer operations? This and much, much more is possible with ADOS-3, our CoCo 3 adaptation of the acclaimed original ADOS, which shares the original's virtual 100% compatibility with commercial software. After customizing ADOS-3 using the provided configuring utility, you can have it burned into an EPROM that plugs into the Disk BASIC ROM socket, or just use it in RAM as a disk utility. (EPROM + burning will cost $15-20; we provide information concerning how you can have this done.) Supports double-sided drives (35, 40, or 80 tracks). FAST and SLOW commands, auto line number prompts, RUNM command, keystroke macros, arrow-key scroll through BASIC programs, auto-edit of error line, and many more valuable features.

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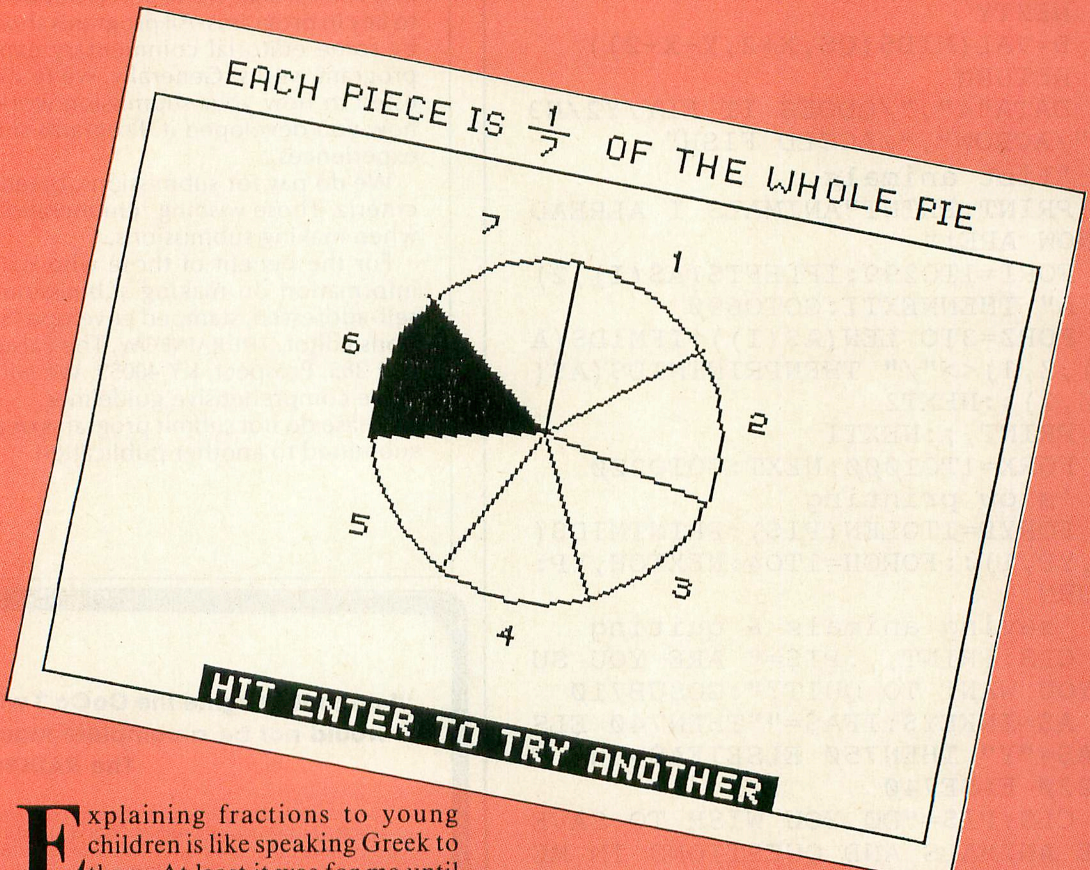
Any Way You Slice It

By Bill Bernico



EACH PIECE IS $\frac{1}{7}$ OF THE WHOLE PIE

HIT ENTER TO TRY ANOTHER

Explaining fractions to young children is like speaking Greek to them. At least it was for me until I got the grasp of how fractions work. The old saying, "Do I have to draw you a picture?" takes on a literal meaning with this program.

Fractions consist of two parts: a numerator and a denominator. Using a pie as an example, the numerator indicates how many pieces from the whole pie are yours, so to speak. The denominator represents the total number of pieces in the pie. When you run *Fraction Pie*, you'll be asked for the denominator, or how many ways you want to divide the pie. The numerator is fixed at one.

You can enter any number between 2 and 9 for the denominator, and it's done with a single keystroke. Let's suppose you enter 7 as your choice. An example will be displayed showing that 7 x $^{1}/_{7}$=1. In other words, your slice of the pie is equal to everyone else's slice. No more. No less.

After a few seconds, another screen will appear, showing the pie itself being divided up into the number of pieces chosen. Each piece will be numbered, and one of the pieces will be painted to highlight it. That one piece is the fraction of that whole pie selected on the first screen. From there, simply press ENTER to keep trying the program over and over.

(Questions or comments regarding this program may be directed to Bill at 708 Michigan Avenue, Sheboygan, WI 53081. Please enclose an SASE when requesting a reply.) ☐

Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.

The listing: FRACTION

```
1 'FRACTPIE by Bill Bernico
       idea by David Polonsky
2 DIMA$(90):P=3.14159:A$(32)="BR
5":A$(40)="BR2HU4EBD6BR3":A$(41)
="BREU4HBD6BR4":A$(45)="BE2R2BR4
BD2":A$(48)="BRHU3ER2FD3GNL2BR4"
:A$(49)="BU4BR2ED5BR3":A$(50)="B
U4ER2FDGL3D2R4BR2":A$(51)="BU5R3
FGNL2FDGL2NHBR6":A$(52)="BR3U5G3
R4BD2BR3
3 A$(53)="BU5NR4D2R3FDGNL3BR4":A
$(54)="BU5BRNR2GD3FR2EUHL2GBD2BR
7":A$(55)="BU5R4D2G3BR6":A$(56)=
"BRNR2HUEHER2FGNL2FDGBR4":A$(57)
="R2EU3HL2GDFR2EBF3":A$(65)="U5E
R2FD3NL4D2BR3":A$(67)="BRNRHU4ER
2FBD4GNL2BR4":A$(68)="U6R3FD4GNL
3BR4":A$(76)="NU6R4BR3
4 A$(69)="NR4U3NR3U3R4BD6BR3":A$
(70)="U3NR3U3R4BD6BR3":A$(72)="U
3NU3R4NU3D3BR4":A$(73)="U6LR2LD6
LR2BR3":A$(75)="U3NU3R2E2UBD3BL2
F2DBR3":A$(77)="U6F3E3D6BR3":A$(
78)="U5NUF4NU5DBR3":A$(79)="BRNR
2HU4ER2FD4GBR4":A$(80)="U6R3FDGN
L3BF3BR
5 A$(82)="U6R3FDGL2NLF3BR3":A$(8
3)="BUFR2EUHL2HUER2FBD5BR3":A$(8
4)="BR2U6NL2R2BD6BR3":A$(85)="BR
HU5BR4D5GNL2BR5":A$(87)="BUNU5FE
2F2ENU5BR3BD":A$(89)="BR2U3H2UBR
4DG2BF3BR2":PMODE4,1:PCLS1:SCREE
N1,1:COLOR0,1
6 A$="INPUT FRACTION":DRAW"S4BM8
0,30":GOSUB13:A$="DENOMINATOR (2
-9)":DRAW"BM65,40":GOSUB13:A$="1
":DRAW"BM110,80S8":GOSUB13:DRAW"
BM108,83R9
7 B$=INKEY$:IFB$=""THEN7
8 B=VAL(B$):IFB<2OR B>9THEN5
9 A$=B$:DRAW"BM112,98":GOSUB13:D
RAW"BM133,87E4BL4F4":A$=B$:DRAW"
BM155,90S12":GOSUB13:DRAW"BM175,
86R3BUL3":A$="1":DRAW"BM190,90":
GOSUB13:FORX=1TO1000:NEXT:DRAW"S
4":PCLS1:LINE(0,22)-(255,191),PS
ET,B:A$="EACH PIECE IS":DRAW"BM2
0,15":GOSUB13
10 A$="1":DRAW"BM110,9":GOSUB13:
DRAW"BM107,11R11":A$=STR$(B):DRA
W"BM106,18":GOSUB13:GOTO14
11 A$="OF THE WHOLE PIE":DRAW"BM
130,15":GOSUB13:FORX=1TO1000:NEX
T:LINE(46,191)-(211,181),PSET,BF
:A$="HIT ENTER TO TRY ANOTHER":D
RAW"BM50,189C1":GOSUB13:DRAW"C0
12 IFINKEY$<>CHR$(13)THEN12ELSE5
13 FORX=1TOLEN(A$):Y=ASC(MID$(A$
,X,1)):DRAWA$(Y):EXEC43345:NEXT:
RETURN
14 GOSUB25:GOTO14
15 ON ASC(A$)-48GOSUB16,17,18,19
,20,21,22,23,24:RETURN
16 DRAWA$(49):RETURN
17 DRAWA$(50):RETURN
18 DRAWA$(51):RETURN
19 DRAWA$(52):RETURN
20 DRAWA$(53):RETURN
21 DRAWA$(54):RETURN
22 DRAWA$(55):RETURN
23 DRAWA$(56):RETURN
24 DRAWA$(57):RETURN
25 Q=0:N=B:IFN<2 OR N>9THEN25
26 Z=N-1:FORJ=0TOZ:L(J)=100/Z:Q=
Q+L(J):NEXTJ:FORJ=0TOZ:M(J)=2*P*
L(J)/Q:NEXTJ:GOSUB27:GOSUB32:PAI
NT(80,95),0,0:GOTO11
27 T=A:SCREEN1,1:CIRCLE(128,96),
50:FORJ=0TOZ:X=128+50*SIN(T):Y=9
6-50*COS(T):LINE(128,96)-(X,Y),P
SET:T=T+M(J)
28 IFT>(2*P)THENT=T-2*P
29 NEXTJ:RETURN
30 LINE(X,Y)-(X,Y),PRESET:RETURN
31 GOSUB30:GOSUB15:PLAY"O5T60B":
EXEC43345:RETURN
32 T=A:FORI=0TOZ:K=126+3*80*SIN(
T+M(I)/2)/4:U=98-3*80*COS(T+M(I)
/2)/4:Y=U:X=K:A$=CHR$(49+I):GOSU
B31:T=T+M(I):NEXTI:RETURN
```

One-Liner Contest Winner . . .

Use the up arrow to fight the force of gravity and avoid the obstacles as you ski cross-country.

The listing:

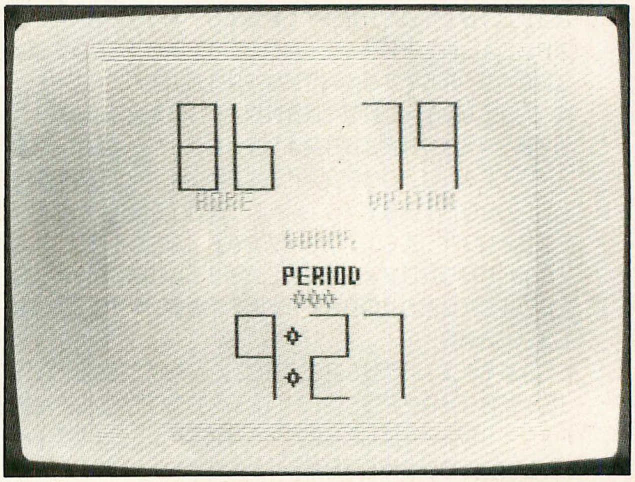
```
0 PMODE3:COLOR2:PCLS:SCREEN1,1:L
INE(0,0)-(256,191),PSET,B:FORY=1
TO25:A=RND(230)+9:B=RND(170)+9:C
IRCLE(A,B),RND(9)+5:PAINT(A,B):N
EXT:FORX=5TO250STEP.5:PSET(X,Y,4
):H=H+.05+.1*(PEEK(341)=247):Y=Y
+H:IFPPOINT(X,Y)=6THENCLSELSENEX
T:PLAY"L8GEL4CEGO4L2C":RUN
```

Peter Hurt
Springfield, VA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

Get the Home Court Advantage

By Mike Cooney



In our house, a Nerf basketball hoop is located near our computer. My little brother plays continuously for hours, and the poor kid always keeps track of everything — time, scores and bonuses — in his head. So, I made him a computer scoreboard.

Now all he has to do is tap a key when he scores. He no longer has to run into the other room to look at the time.

Here's how it works. The computer draws the scoreboard and numbers on a Hi-Res screen and uses only 2K of memory. Each quarter lasts 10 minutes. If this is too long or short, you can speed or slow the program by changing the 25 in Line 100. A higher number makes a slower program.

Table 1 refers to the keys that represent the different functions of the scoreboard. I didn't bother with a game-save since you usually play an entire game at one time. However, it can easily be added if anyone has the need for one.

So let's shoot some hoops!

(Questions or comments may be addressed to Mike at 1773 Crider Road, Mansfield, OH 44903. Please enclose an SASE when requesting a reply.) ☐

Mike Cooney, a junior in high school, has been programming for three years and has won THE RAINBOW *one-liner contest several times.*

16K ECB

Table 1

Key	Function
↑	.... Home score for hundreds
Q	.... Home score for tens (from 0 to 9 and then starts over)
W	.... Home score for ones (from 0 to 9 and then starts over)
E	.... Erases hundreds for home and visitor
I	.... Visitor score for hundreds
O	.... Visitor score for tens (from 0 to 9 and then starts over)
P	.... Visitor score for ones (from 0 to 9 and then starts over)
Space bar	.... Stops clock
T	.... Buzzer that stops clock
B	.... Bonus sign
V	.... Bonus points to home
N	.... Bonus points to visitor
C	.... Clears bonus
/	.... Sets period

```
100 ......154
300 ......226
500 ......113
END .....200
```

The listing: SCOREBRD

```
0 '*****SCOREBOARD*****'
1 '*********BY*********'
2 '****MIKE  COONEY****'
10 POKE65495,0
20 PMODE3,1:PCLS:SCREEN1,0:Z=1:P
1=1
30 DRAW"BM106,115U8R4D4NL4D1C1D3
R4C4NR4U4NR4U4R4R2C1D8R3C4U8R4D4
L4R1F3D1R1C1R3C4NU8R1C1R3C4U8R4D
8NL4R1C1R3C4U8R2F2D4G2L2":DRAW"C
2":CIRCLE(114,122),4:DRAW"C4"
40 DRAW"C3":FORE=1TO10STEP2:LINE
(0+E,0+E)-(255-E,191-E),PSET,B:N
EXT:DRAW"C4"
50 DRAW"BM50,30":GOSUB450:DRAW"B
M80,30":GOSUB450
60 DRAW"BM150,30":GOSUB450:DRAW"
BM180,30":GOSUB450
70 DRAW"BM60,80C3U8D4R4U4D8R2C1R
3C3U8R4D8NL4R2C1R2C3U8D1F2E2U1D8
R2C1R2C3NR4U4NR4U4R4"
80 DRAW"BM154,72D6F2E2U6R2C1R3C3
D8R1C1R2C3R4U4L4U4R6C1D8R3C3U8R2
C1R2C3R4L2D8R1C1R4C3U8R4D8NL4R2C
1R3C3U8R4D4L4R1F3D1
90 GOSUB550:EXEC44539:FORC=1TO70
0:NEXTC:DRAW"C1BM70,130D48C4"
100 M=9:S=5:H=11
110 PLAY"V10O1T255L255":H=H-1:IF
H<1THENH=10:S=S-1:IFS<0THENM=M-1
:H=10:S=5:IFM<0THENGOSUB620
120 DRAW"BM80,130":ON M+1 GOSUB4
50,460,470,480,490,500,510,520,5
30,540
130 DRAW"BM120,130":ON S+1 GOSUB
450,460,470,480,490,500,510,520,
530,540
140 DRAW"BM150,130":ON H GOSUB45
0,460,470,480,490,500,510,520,53
0,540
150 J=0
160 J=J+1
170 I$=INKEY$
180 IFI$="Q"THENQ=Q+1:GOSUB330
190 IFI$="W"THENW=W+1:GOSUB360
200 IFI$="O"THENO=O+1:GOSUB390
210 IF I$="/"THEN GOSUB 600
220 IFI$="P"THENP=P+1:GOSUB420
230 IFI$="B"THENGOSUB560
240 IFI$="V"THENGOSUB580
250 IFI$="N"THENGOSUB590
260 IFI$="E"THENDRAW"C1BM40,30D4
0BM140,30D40C4"
270 IFI$=" "THENEXEC44539
280 IFI$="T"THENSOUND1,5:EXEC445
39
290 IFI$="^"THENDRAW"BM40,30D40"
300 IFI$="I"THENDRAW"BM140,30D40
"
310 IFI$="C"THENDRAW"C1":LINE(95
,90)-(165,100),PSET,BF:DRAW"C4"
320 IFJ>25THENJ=0:GOTO110ELSEGOT
O160
330 DRAW"BM50,30":IFQ=10THENQ=0
340 ON Q+1 GOSUB450,460,470,480,
490,500,510,520,530,540
350 GOTO 160
360 DRAW"BM80,30":IFW=10THENW=0
370 ON W+1 GOSUB450,460,470,480,
490,500,510,520,530,540
380 GOTO160
390 DRAW"BM150,30":IFO=10THENO=1
```

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```
400 ON O+1 GOSUB450,460,470,480,
490,500,510,520,530,540
410 GOTO160
420 DRAW"BM180,30":IFP=10THENP=0
430 ON P+1 GOSUB450,460,470,480,
490,500,510,520,530,540
440 GOTO160
450 DRAW"R20D20C1NL19C4D20L20U40
":RETURN
460 DRAW"C1NR20D20NR20D20R20C4U4
0":RETURN
470 DRAW"C1ND19C4R20D20C1ND20C4L
20D20R20":RETURN
480 DRAW"C1ND40C4R20D20NL20D20L2
0":RETURN
490 DRAW"C1NR20C4D20C1D20NR20U20
C4R20U20D40":RETURN
500 DRAW"NR20D20C1ND19C4R20C1NU1
9C4D20L20":RETURN
510 DRAW"C1R20ND20L20C4D40R20U20
L20":RETURN
520 DRAW"C1D20NR20D20NR20U40C4R2
0D40":RETURN
530 DRAW"R20D20NL20D20L20U40":RE
TURN
540 DRAW"D20C1D20NR20U20C4R20U20
NL20D40":RETURN
550 DRAW"C4":CIRCLE(110,140),4:C
IRCLE(110,160),4:DRAW"BM70,130D4
0R1C1R9C4NR20U40R20D40R1C1R19C4N
R20U40R20D40R1C1R9C4NR20U40R20D4
0":RETURN
560 DRAW"BM108,90C3D8R3E1U2H1NL3
E1U2H1NL2R2C1R3C3D8R4U8NL4R2C1R3
C3ND8D1F4ND3U5R2C1R2C3D8R4U8R2C1
R2C3NR4D4R4D4L4
570 RETURN
580 DRAW"C3BM100,90G4F4":RETURN
590 DRAW"C3BM153,90F4G4":RETURN
600 P1=P1+1:IFP1=5THENDRAW"C1":L
INE(100,118)-(150,128),PSET,BF:P
1=1
610 DRAW"C2":FORRQ=1TOP1:CIRCLE(
106+(RQ*8),122),4:NEXTRQ:DRAW"C4
":RETURN
620 PLAY"V31O1T1L1C":EXEC44539:G
OTO90
```

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A new generation of CoCo III software

RAINBOW CERTIFICATION SEAL

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(CoCo III only)

An easy to use, versatile label creating program including many new CoCo III features. Even if you already own a label program, this one's a must for the III!!

(See July '87 review) Disk $16.95

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RAINBOW CERTIFICATION SEAL

(CoCo III only)

Easily alter the contents of any palette without having to remember numbers or colors! Once configured, all sixteen palettes can be saved to disk as a single subroutine which may then be used in a basic program.

(See Aug. '87 review) Disk $19.95

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This machine language utility modifies DECB 1.0, 1.1, or FKEYS III to allow the use of 3 double-sided drives (or 2 double-sided drives and **J & R'S RAMDISKS**) as 6 single-sided drives without ANY hardware mods. Includes 2 selectable drive assignments and it's EPROMable.

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(See June '87 review)

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Buffer Capture Garbage

By Cray Augsburg
Rainbow Technical Editor

Recently, several of us at Falsoft have had problems capturing data by opening and closing our *MikeyTerm* buffers. Everything looks OK when we display the buffer. But, when we try to print the contents of the buffer, all we get is garbage. Or better yet, our printer does a song and dance routine that causes the final copy to be liberally sprinkled with characters of every imaginable type style.

We don't quite have a hold on the cause for these problems. They mysteriously started despite our having made no changes in our communications parameters. It doesn't happen all the time, either. While we are looking for the root of the problem, we can offer a simple cure if you are also experiencing such difficulties. The next time you log on, try setting your communications parameters to 7-bit, even parity. This will cause your terminal program to "strip out" the offending control characters that are somehow appearing in the text.

The FCC Strikes

Earlier this year, the Federal Communications Commission (FCC) considered a proposal that would subject packet-switch data network providers, such as Telenet and Tymnet, and online service providers, like CompuServe and The Source, to an interstate access fee. The immediate effect would be a substantial increase in the cost of using such services as Delphi and those mentioned above.

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

DATABASE REPORT

This month was a busy one on THE RAINBOW SIGs! Uploading activity was brisk as users were busy drawing and digitizing pictures, and writing utilities, patches and games to share with others. It was also the month when the shadow of a new FCC proposal passed over the online community.

OS-9 Online

In the General topic area, **Brian Wright** (POLTERGEIST) posted a text file concerning proposed FCC changes relating to online communications services such as Delphi. These articles describe a potentially dangerous proposal by the FCC that would levy an extra surcharge on data carriers like Telenet, Tymnet, etc. This would increase the hourly cost of being online by as much as $5 per hour. Also included were tips on how to communicate effectively with the FCC commissioners in order to register your complaint. (These files were posted on the CoCo SIG also.)

Brian also posted a second file concerning OS-9 concepts for beginners. **Kevin Darling** (KDARLING) posted a text file concerning the use of the Multi-Pak Interface and slot selection, OS-9 drivers and how to convert an RS-232 pack so that two can be used at one time.

In the Graphics topic area, **Steve Clark** (STEVECLARK) sent a graphics print from disk utility, and **Greg Law** (GREGL) provided his utility MGEPIX for displaying MGE-format pictures under Level II.

In the Users Group topic area, Greg Law uploaded more of the Users Group files, namely ADVENT, BUILD, BREAK, BOOTSPLIT, BLANKO, BINCOM, BIN2BCD, BESSEL, BDUMP, AVERAGE STDEV, ATTR_CHG.B09, HELP.C and and HELP.A.

In the Applications topic area, **Ed Orbea** (BASQUE) sent us PILOT, a complete interpreter and support files for the PILOT C.A.I. language.

In the Utilities topic area, **George Janssen** (GBJANSSEN) uploaded a freeware file compression utility called PAK. **Mark Kowit** (TOBOR8) sent us a set of three utilities to provide color, CLS and bold commands. Steve Clark uploaded a shell

The telecommunications community recognized the disastrous effects of such a surcharge and mounted a letter-writing campaign to the FCC, which responded by officially deciding not to act on the matter. Now it appears the commission was only trying to let the dust settle. It recently revived the issue by recommending that enhanced service providers should be subjected to the interstate access fee.

What does this mean to the average user of online services? As much as $5 per hour in additional access fees. Such a surcharge could be expected to price most individuals out of the nationwide telecommunications market and force many of the public information services out of business.

In a brow-raising move, obviously related to the flak it caught the first time around, the FCC is not currently taking opinions from the public concerning the matter. Instead, it has announced that it is considering the new rules and will request opinions from certain parties at a future date.

At this time, interested telecommunicators can do two things to make their feelings known. First, write to your congressmen, express your displeasure and ask them to do whatever they can to help. Be sure to refer to the FCC proposal by name, "Amendment of Part 69 of the Commission's Rules relating to Enhanced Service Providers, General Docket 87-215," and state specifically why you are opposed to it.

Second, call Telenet at 1-800-TELENET and tell them you want to help stop the surcharge. (Expect to be put on hold.) They will take your name, address and telephone number and, when the FCC decides to accept opinions from the public, will call on you to make your case by writing letters to the commission itself.

> ***"These changes have been long-awaited and are very important."***

New Places for Old Commands

Delphi, as many of you well know, has been working diligently to make the system as easy to use as possible. They have made a good dent in the command areas of /SEND, /ENT, /WHO, /MAIL and /WHOIS. Now these commands are available in Workspace as well as Forum.

Each of the commands is usable while at the Workspace or Forum prompts. In addition, they can be used within a Forum message. The only requirement is that you must enter them as the very first characters on a new line. Unfortunately, however, they will not work from within a Forum message if you are currently set to use the EDT editor. You must be using Oldie. You can set this by using the SETTINGS command in Workspace. If you have entered Mail from the WS> or FORUM> prompt, pressing CTRL-Z will return you from where you came just as it does from Conference.

Another important change is that Delphi will now put all received sends and pages in a queue if you happen to be downloading or uploading. While performing such a file transfer, if another user sends you a message with /SEND or pages you with /PAGE, the messages will be put on a stack. When you are finished with the file transfer, these messages will appear on the screen so that you can respond to them.

These changes have been long-awaited and are very important. Now you can find out someone's real name or information without having to back out of a message. More importantly, you won't miss any queries from other users just because you were busy downloading. Eventually, Delphi hopes to initiate a message queue that is enabled any time you are busy. □

---

procedure (script) to send control codes to a DMP-120 printer for Level II. It includes the use of a dialog box and menu.

In the Device Drivers topic area, **Andrew Hart** (ANDYL) sent us a device driver to use the Disto hardware clock in a RAM pack under Level II and complete documentation. His driver temporarily slows down the clock while accessing the clock chip, which has a rather long access time of six microseconds. **Ken Schunk** (KENSCHUNK) provided a new CC3Disk module, a replacement driver for OS-9 Level II written by Volney Larowe. It allows Level II to use the old 12-volt controllers and fixes two problems with the stock driver, a Side Select Error and the lack of Device Timeout Errors. It also allows the use of 48 tpi disks in 96 tpi drives.

In the Telecommunications topic area, Greg Law provided the file XCOM9 V. $0A, the latest version of this popular OS-9 terminal program. It contains several bug fixes and added commands.

CoCo SIG

In the General topic area, I provided a text file describing the standards and file-naming conventions used in THE RAINBOW CoCo SIG's database.

In the Source Code topic area, **Roger Krupski** (HARDWAREHACK) provided a muticolumn directory routine. **Doug Masten** (DMASTEN) provided us with a routine to test a CoCo 3 for memory size, and I provided a simple memory sense subroutine for the CoCo 1 and 2.

In the Utilities & Applications topic area, Roger Krupski posted the binary version of his multicolumn directory utility. Roger also sent us a BASIC Hi-Res picture saver and a one-swap backup utility for the CoCo 3. **Robert Pierce** (RPIERCE) sent us an example start-up file for the CoCo 3, and **Mike Salisbury** (MISAL) gave us a text reader program and an appointment calendar program. **Earl Knutson** (BJORNKNUTSON) uploaded his *Disk Jockey* program, and a nice ham radio log book utility was sent to us by **Dennis Hoin** (HACKER1). **Mike Tolbert** (MIKEGT) posted his *Auto Boot* program for the CoCo 3.

In the Hardware topic area, **Marty Goodman** (MARTYGOODMAN) provided two new articles. The first describes how to modify one of the older Disto 512K RAM disks for 1.8 MHz operation and suggests a fix for the Level 1 OS-9 RAM disk drivers that came with the card. The second provides information describing a problem in the display of the CoCo 3 (image absent or text shifted left at power up) and two possible ways to fix this problem.

In the Games topic area, **Dave Ferreira** (SKEEVE) sent us a biorhythm program that he modified to use **Steve Bjork**'s *Mouse* program and his maze generator program. Brian Wright provided a clever game called *Kamakazie Kar*. **Merle Metzger** (MERLEMETZGER) uploaded two picture maps describing the *Dungeons of Daggorath* game course. Mike Salisbury uploaded a golf game, and **Jim Pogue** (JIMPOGUE) sent us his fine Scrabble-like game.

The Graphics topic area was the most active database topic this month. Most of the uploads consisted of MGE-format CoCo 3 pictures. It should be mentioned that all MGE files on the SIG are saved in compressed format unless a "bit-mapped" format would result in a smaller file. MGE-format pictures may be as large as 32K and can occupy up to 14 grans on a disk. *Color Max 3* provides for horizontal compression, and we ensure that all MGE files are saved in the format that results in the smallest file size. This means that our users may download more pictures in the same time and thereby gain more for their Delphi dollar.

This month's uploads: **Chris Brown** (CRISPWILLIAM) sent us six outstanding pictures and `MGELOOK.BAS`, a BASIC program that provides an automated display of all MGE files on a disk. `MGELOOK` interfaces with **Greg Miller**'s (GREGMILLER) `BSCTOOL` utility to do its work. **Richard Trasborg** (TRAS) sent us *Mr. T's Coloring Book*, a group of three nudes that the user may color, and `MARINA`, a nude picture converted from an Atari ST picture. Previously, Richard had sent us six original nudes for the CoCo 3. **Jason Forbes** (COCO3KID) sent us seven other converted Atari pictures. He also uploaded a grouping of 32 different fonts, which one may `LOADM` into his CoCo 3 and then use with the `HPRINT` command. All of these fonts are very nicely detailed. **Michael Schneider** (MSCHNEIDER) sent us three James Bond pictures that were originally created by a CoCo 3 artist in Israel for the Atari ST. He also sent us `STARWARS`, an MGE picture of a scene from the classic movie *Star Wars*. I converted eight previously uploaded pictures from Atari format into MGE format and furnished them to the database. I also converted two pictures from OS-9 Online from VEF format and furnished them to the database in MGE format. **Erik Gavriluk** (ERIKGAV) provided us with an outstanding MGE picture of Christie Brinkley taken from a digitized picture done on the MacIntosh, cleaned-up and colored-in using *Color Max 3*.

Mike Fischer (MIKE88) sent us a turtle graphics demonstration program by Gian Polizzi, graphics programmer for the Island CoCo Club. Mike also sent us six programs that are palette switching demos, two of which were written by Gian Polizzi. **Joab Jackson** (JOAB) sent us a program called *Galactic Orchids*, which creates abstract patterns on the CoCo 3. **Kurt Stecco** (HIGHRAILER) gave us eight more converted ST pictures in MGE format. Kurt's contributions include some digitized pictures of cars and trains, plus some interesting product logos.

Ned Smith (NEDSM) sent us his picture of the Voyager, drawn using BASIC commands. Brian Wright sent us his short program that demonstrates squares and rectangles on the CoCo 3. **D.K. Lee** (HORNET1) provided us with a picture of a baby dinosaur that he drew using *Color Max 3*. He also provided a picture of small animals in a pond setting, which was drawn by his 11-year-old son. Both of these pictures are very colorful. **Bob Wharton** (BOBWHARTON) sent us his first *Color Max 3* picture, a drawing of Larry Bird of the Celtics.

In the Music topic area, **John Brennan** (FIREFLY) gave us his rendition of the theme music to *The Honeymooners* show. **Bill Starr** (WSTARR) sent us two more popular `Orchestra-90` files.

In the Product Announcements topic area, **Chad Rogers** (ICMR) provided his assessment of the `RGBPATCH` program from Spectral Associates. This program supposedly provides `PMODE 4` colors when CoCo 1 or 2 programs and games are run on a newer CoCo 3. Chad exlains some of his reservations about the product.

In the Data Communications topic area, (IJOSHI) provided us with a list of San Francisco area BBSs. **Bill Haesslein** (BILLH) uploaded his parameter loader program for use with *Greg-E-Term*. It allows one to load the appropriate parameters for up to 20 different configurations. Brian Wright provided a simple terminal program for conversation-oriented BBSs and Version 2 of the `MABEL` terminal program.

As you can see, CoCo users are keeping busy during the summer! We hope to see all of you online soon!

— Don Hutchison
(DONHUTCHISON)
Rainbow's Delphi Database Manager

The Rainbow Introductory Guide to

Statistics

Most people have been using statistics since they learned to talk. Statistical results and concepts turn up everywhere. A large part of our daily news consists of statistics. Results of opinion polls, surveys, research studies, the Dow Jones industrial average and, of course, our sports news are all statistics. But statistics are often misused. The informed person needs to understand the basic concepts in order to judge the appropriateness of applications.

Rainbow Contributing Editor Dr. Michael Plog and coauthor Dr. Norman Stenzel have written **The Rainbow Introductory Guide to Statistics** just for beginners. It is an easy-to-understand guide to this sometimes mysterious area of mathematics. Their aim is to introduce readers to the realm of statistical processes and thinking, and they believe that the Tandy Color Computer is an ideal machine for the reduction of data.

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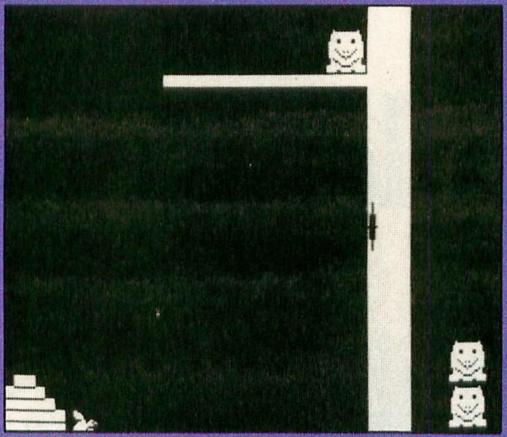
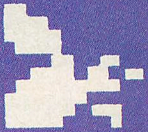


Bee Zapper

By Daren Koch



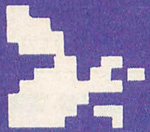
A chameleon is an animal with a long tongue that it lashes out to catch insects. In this game, you are a chameleon perched on a tree branch near a beehive. You must lash out your tongue at the bees in order to catch them. The branch that the chameleon is sitting on gets smaller as each bee makes it to the tree trunk. If the branch gets too small, you lose a life.

You control the chameleon with the right joystick. There is a bird that flies out of a hole in the tree. You will see it a few seconds before it starts to move. If it bites your tongue, you lose a life. The bird can be killed by simply zapping it on the back as it flies by.

As you advance through the levels, the bird appears more often and there are fewer bees to eat. After Level 4, the branch doesn't get any longer except when you lose a life. After Level 5, you are rewarded with another life. It's a real challenge to reach these levels.

Here's how the scoring works. In the first level, you receive 75 points for each bee killed; in the second level, you receive 100 points, etc. You receive 200 points when the bird is killed. You get a bonus after every level if you have not allowed more than five bees to reach the trunk of the tree.

This game doesn't take long to type in, but it uses lots of memory. It can only be run on a 64K Extended BASIC machine. I included a `POKE` statement to make the machine run faster. In order to save the program, this poke must be countered; otherwise, it cannot be retrieved. Enter `POKE 65494,0` before saving.



(Questions about this program may be addressed to the author at 212 Pierre Connefroy, Boucherville, Quebec, Canada J4B 1K6. Please enclose an SASE for a reply.) □

Daren Koch is a 19-year-old college student majoring in computer science. In his spare time, he enjoys playing with his computer.

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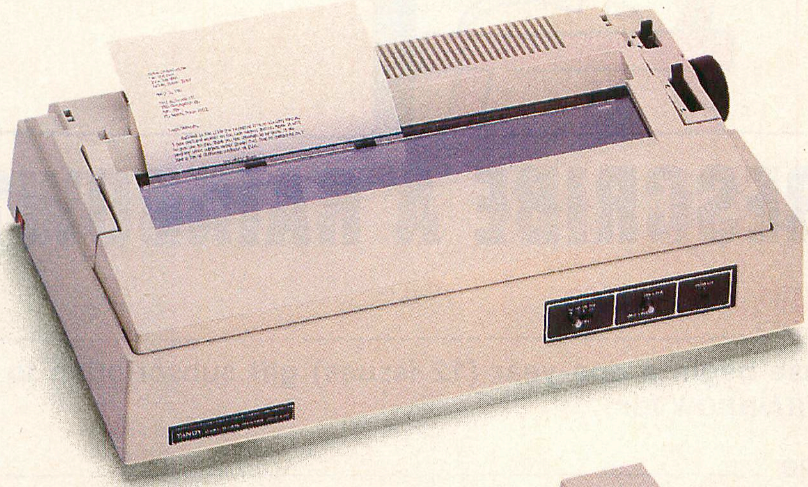

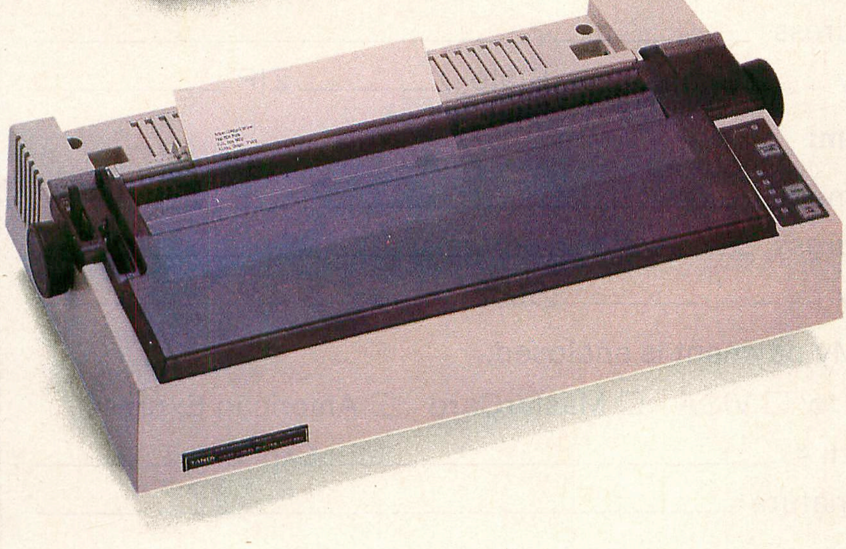

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22	195
37	37
49	119
65	188
75	107
87	92
97	172
END	9

The listing: BEEZAP

```
1 '*****************************
2 '*  WRITTEN BY DAREN KOCH    *
3 '*    ORIGINAL IDEA BY       *
4 '*     FRANCOIS GAGNE        *
5 '*****************************
6 POKE 65495,0
7 GOSUB21
8 PMODE4,1:PCLS
9 GOSUB37
10 B1=1:P=100:H=180:O1=210:O=5:B
=5:X=160:D=40:N=9:W=1:V=1:A2=5
11 GOSUB24
12 GOSUB78
13 GOSUB18
14 PMODE4,1:SCREEN1,1
15 GOSUB85
16 GOSUB99
17 GOTO15
18 LINE(220,100)-(240,191),PRESE
T,BF:IFV>-1 THENFOR A=170 TO170-
(V*20) STEP -20:PUT(220,A)-(238,
A+18),C,PSET:NEXTA
19 IFV=-2 THENCLS(7):PRINT@43,"G
AME OVER";:PRINT@128,"YOUR SCORE
 IS ";L1;:PRINT@256,"DO YOU WANT
 TO PLAY AGAIN? (Y/N)";:INPUTA$:
IFA$="Y" THENRUN ELSE END
20 RETURN
21 CLS7:PRINT@43,"CHAMELEON";
22 PRINT@263,"ONE MOMENT PLEASE"
;
23 RETURN
24 FORQ=1TON:X(Q)=31:Y(Q)=(RND(0
)*4)+2:NEXTQ:RETURN
25 CLS(RND(8)):IFL3<6 THENPRINT@
192,"BONUS ";100*B1;:L1=L1+100*B
1
26 IFL3>5 THENPRINT@192,"NO BONU
S";
27 PRINT@256,"YOUR SCORE IS ";L1
;
28 PRINT@6,"LEVEL ";B1;" COMPLET
E";
29 IFB1=4 THENA2=0
30 IFB1=5 THENV=V+1:GOSUB18
31 PRINT@480,"PRESS FIRE TO CONT
INUE";
32 IF(PEEK(65280) AND3)=2 THEN 3
3 ELSE32
33 IFV=-2 THENRETURN ELSEPMODE4,
1:SCREEN1,1
34 M1=0:L3=0:B=B-A2:IFB<0 THENB=
0
35 GOSUB78:B1=B1+1:P=P-20:IFP<20
 THENP=20:A1=0
36 RETURN
37 DATA 1,10,16,2,9,13,3,3,4,3,7
,10,4,2,2,4,4,13,5,0,18,6,2,4,6,
6,14,7,8,12,10,3,4,10,7,11,11,2,
2,11,4,13,12,0,18,13,2,4,13,6,14
,14,7,10,15,9,13,16,10,16
38 DATA-1,,
39 READ A,B,C:IFA=-1 THEN42
40 FORX=B TOC:PSET(X+100,A):NEXT
X
41 GOTO39
42 DATA 1,3,3,1,15,15,2,3,15,3,2
```

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,16,4,2,16,5,2,4,5,7,11,5,14,16,
6,1,4,6,7,11,6,14,17,7,1,17,8,1,
17,9,1,3,9,5,13,9,15,17,10,1,4,1
0,6,7,10,9,9,10,11,12,10,14,17,1
1,1,5,11,7,11,11,13,17,12,1,6,12
,9,9,12,12,17,13,2,2,13,16,16,13
,4,8,13,10,14,14,2,3,14,6,12
43 DATA 14,15,16,15,2,5,15,7,11,
15,13,16,16,0,6,16,12,18,17,0,18
,18,0,4,18,7,11,18,14,18
44 DATA -1,,
45 READA,B,C:IFA=-1 THEN48
46 FOR X=B TOC:PSET(X+200,A):NEX
TX
47 GOTO45
48 DATA 1,3,3,1,15,15,2,3,15,3,2
,16,4,2,16,5,2,4,5,7,11,5,14,16,
6,1,4,6,7,11,6,14,17,7,1,17,8,1,
17,9,1,3,9,5,13,9,15,17,10,1,3,1
0,6,7,10,9,9,10,11,12,10,15,17,1
1,1,3,11,7,11,11,15,17,12,1,3,12
,9,9,12,15,17,13,1,4,13,14,16,14
,2,2,14,4,5,14,13,14
49 DATA 14,16,16,15,2,3,15,5,6,1
5,12,13,15,15,16,16,0,4,16,6,7,1
6,11,12,16,14,18,17,0,7,17,11,18
,18,0,4,18,7,7,18,11,11,18,14,18
50 DATA -1,,
51 READA,B,C:IFA=-1 THEN 54
52 FORX=B TO C:PSET(X+200,A+25):
NEXTX
53 GOTO51
54 DATA 5,8,9,6,2,5,6,7,8,6,10,1
0,7,1,5,7,7,9,8,0,4,8,6,6,9,0,1,
9,5,5,9,7,9,10,0,4,10,9,9
55 DATA -1,,
56 ZZ=50
57 READ A,B,C:IFA=-1 THEN 60
58 FORX=B TO C:PSET(X+200,A+70):
NEXTX
59 GOTO57
60 DATA 1,0,1,2,0,3,3,0,4,4,1,4,
5,4,5,5,8,9,6,2,5,6,7,8,6,10,10,
7,1,9,8,0,6,9,0,5,9,7,9,10,0,4,1
0,9,9
61 DATA-1,,
62 READ A,B,C:IFA=-1 THEN65
63 FORX=B TOC:PSET(X+200,A+90):N
EXTX
64 GOTO62
65 DATA 1,1,1,2,0,2,3,1,1,4,0,2,
5,1,1,6,0,2,7,1,1,8,0,2,9,1,1,10
,0,2,15,1,1,16,0,2,17,0,2,18,0,2
,19,0,2,-1,,
66 READ A,B,C:IFA=-1 THEN 69
67 FORX=B TO C:PSET(X+200,A+110)
:NEXTX
68 GOTO66
69 DIMC(18,18),C1(18,18),C2(18,1
8),B(10,10),B1(10,10),B2(10,10),
F(3,10),F2(3,10),F1(3,5),F3(3,5)
,X(10),P(10),Y(10),O(18,7),O1(18
,7),O2(18,7),O3(18,7)
70 GET(200,1)-(218,19),C,G:GET(2
00,26)-(218,44),C1,G:GET(0,0)-(1
8,18),C2,G:GET(200,71)-(210,81),
B,G:GET(200,91)-(210,101),B1,G:G
ET(0,0)-(10,10),B2,G:GET(200,111
)-(203,121),F,G:GET(0,0)-(3,10),
F2,G:GET(200,125)-(203,130),F1,G
:GET(0,0)-(3,5),F3,G
71 GET(100,0)-(118,7),O,G:GET(10
0,10)-(118,17),O1,G:GET(0,0)-(18
,7),O2,G
72 PCLS
73 LINE(180,0)-(200,191),PSET,BF
74 LINE(5,165)-(15,170),PSET,BF:
LINE(0,170)-(20,175),PSET,BF:LIN
E(0,175)-(25,180),PSET,BF:LINE(0
,180)-(30,190),PSET,BF:LINE(5,17
0)-(15,170),PRESET:LINE(0,175)-(
20,175),PRESET:LINE(0,180)-(25,1
80),PRESET:LINE(0,185)-(30,185),
PRESET
75 FOR X=0TO5:CIRCLE(182,100),2,
0,X:NEXTX
76 GET(180,95)-(198,102),O3,G
77 RETURN
78 IFB=14 THENB=16:F=0
79 LINE(30,36)-(180,40),PRESET,B
F
80 LINE(30+(10*B),36)-(180,40),P
SET,BF
81 S=30+(10*B)
82 IFB=16 THENFORJ=17 TO170 STEP
4:PUT(X,J)-(X+18,J+18),C,PSET:PU
T(X,J)-(X+18,J+18),C2,PSET:NEXTJ
:B=5:LINE(30+(10*B),36)-(180,40)
,PSET,BF:S=30+(10*B1):V=V-1:GOSU
B18:F=0:RETURN
83 IFX<S ANDB<16THENPUT(X,17)-(X
+18,35),C2,PSET:PUT(X+10,17)-(X+
28,35),C1,PSET:X=X+10:IFD>40 THE
NLINE(X-3,41)-(X,D+15),PRESET,BF
:F=0:D=40
84 RETURN
85 IFF=0 THEN86 ELSE89
86 J=JOYSTK(0):PUT(X,17)-(X+18,3
5),C2,PSET:IFJ=<20 ANDX>S+4 THEN
X=X-5 ELSEIFJ=>40 ANDX<160 THENX
=X+5
87 PUT(X,17)-(X+18,35),C,PSET
88 IF(PEEK(65280) AND3)=2 THENF=
1
89 IFF=2 THEN96
90 IFF=1 THEN91 ELSERETURN
91 PUT(X,17)-(X+18,35),C1,PSET:P
UT(X+8,D+1)-(X+11,D+11),F,PSET:P
UT(X+8,D+11)-(X+11,D+16),F1,PSET
:D=D+10:IFD+6=96 ANDX+9>H ANDX+9
<H+18 THENPUT(H,95)-(H+18,102),O
2M,PSET:M1=0:F=2:H=180:M=0:L1=L1
+200
92 IFD=180 THEN93 ELSERETURN
93 F=2:FORR=1 TON:IFX+11>X(R) AN
DX+8<X(R)+10 THENPUT(X(R),180)-(
X(R)+10,190),B2,PSET:X(R)=31:Y(R
)=(RND(0)*4)+2:K=1:PUT(O1,O)-(O1
+10,O+10),B1,PSET:O=O+15:L=L+1:L
1=L1+50+(25*B1):IFO=110 THENO=5:
O1=230
94 IFL=14 THENL2=L2+25:LINE(31,1
80)-(180,191),PRESET,BF:PUT(X,17
)-(X+18,35),C2,PSET:LINE(201,0)-
(256,120),PRESET,BF:LINE(X+8,41)
-(X+11,190),PRESET,BF:O=5:M=0:M1
=0:Z=0:K=0:F=0:L2=L2+1:O1=210:X=
160:D=40:L=0:GOSUB25:IFN>4 THENN
=N-2:GOSUB24:GOTO85
95 NEXTR:RETURN
96 PUT(X+4,D)-(X+14,D+10),B2,PSE
T:D=D-10:PUT(X+8,D+11)-(X+11,D+1
6),F3,PSET:PUT(X+8,D+1)-(X+11,D+
11),F2,PSET:IFD=40 THENF=0:K=0
97 IFK=1 THENPUT(X+4,D)-(X+14,D+
10),B1,PSET
98 RETURN
99 Z=Z+1:IFZ=N+1 THENZ=1
100 PUT(X(Z),180)-(X(Z)+10,190),
B2,PSET
101 X(Z)=X(Z)+Y(Z):W=W*-1:IFW>0
THENPUT(X(Z),180)-(X(Z)+10,190),
B,PSET ELSEPUT(X(Z),180)-(X(Z)+1
0,190),B1,PSET
102 IFX(Z)=>169 THENB=B+1:L3=L3+
1:PUT(X(Z),180)-(X(Z)+10,190),B2
,PSET:X(Z)=31:Y(Z)=(RND(0)*4)+2:
GOSUB78
103 M=M+1:IFM=P-15 THENM1=1 ELSE
IFM=P THENM1=2
104 IFM1>0 THENIFM1=1 ANDW>0THEN
PUT(H,95)-(H+18,102),O,PSET ELSE
IFM1=1 THENPUT(H,95)-(H+18,102),
O1,PSET ELSEPUT(H,95)-(H+18,102)
,O2,PSET:IFH=<5 THENM1=0:M=0:H=1
80
105 IFM1=2 THENH=H-5:IFW=>0 THEN
PUT(H,95)-(H+18,102),O,PSET ELSE
PUT(H,95)-(H+18,102),O1,PSET
106 IFM1>0 ANDPPOINT(H-1,98)>0 T
HENB=16:GOSUB78:F=0:X=160:D=40
107 IFH=160 THENPUT(180,95)-(198
,102),O3,PSET
108 RETURN
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We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service. An order form for these services is on the insert card bound in the magazine.

What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. (While many TDP-100s are still in service, the TDP Electronics division of Tandy no longer markets the CoCo look-alike.) It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

Rainbow Check Plus

The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: `CMDS` and `SOURCE`. It also contains a file, `read.me.first`, which explains the division of the two directories. The `CMDS` directory contains executable programs and the `SOURCE` directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the `SOURCE` directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the `CMDS` directory, enter `dir cmds`. Follow a similar method to see what source files are in the `SOURCE` directory.
5) When you find a program you want to use, copy it to the `CMDS` directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/` *filename* `/d0/cmds/` *filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/` *filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

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SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any commercial product*, regardless of whether the firm advertises or not.

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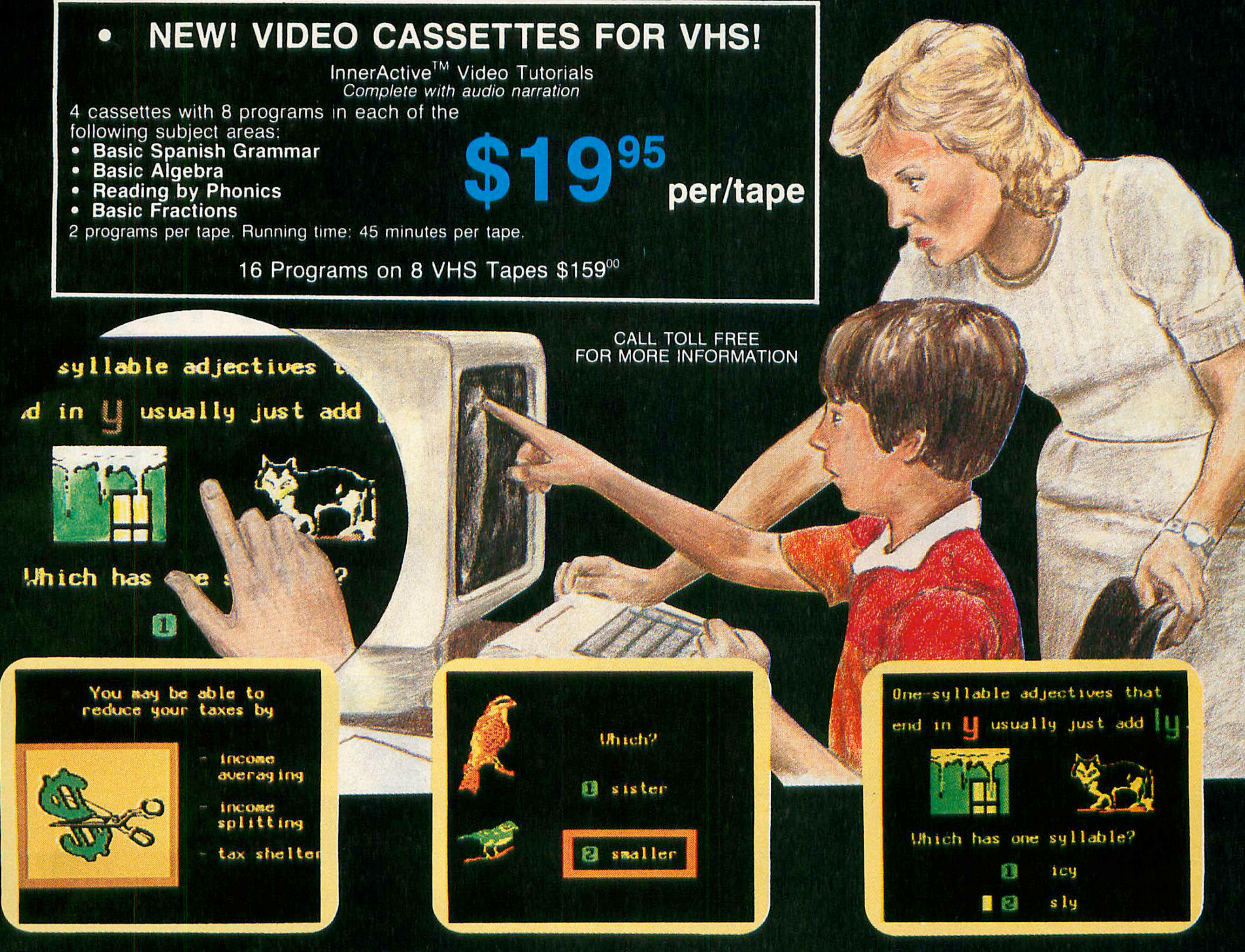

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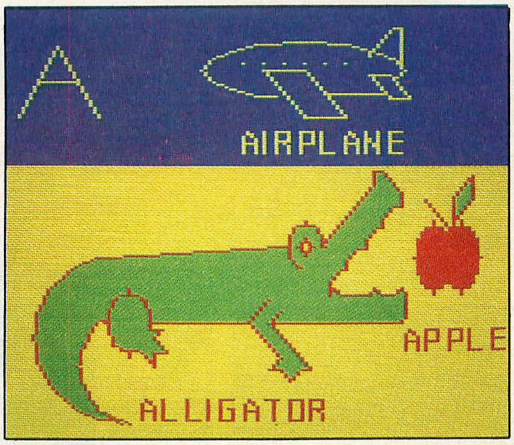
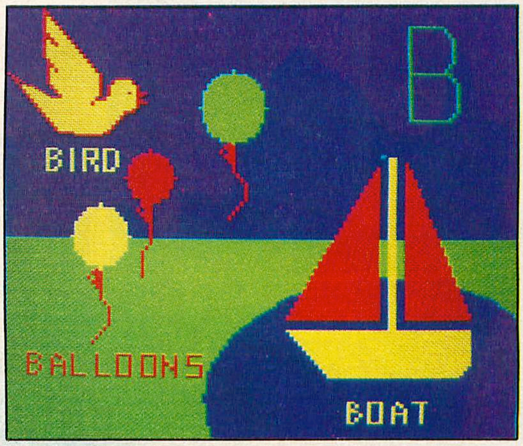
ABC Is Not Just Child's Play



By Ann B. Mayeux



A-B-C-D-E-F-G. Even very little children can sing or hum along, and they are fascinated by that "funny TV" in the corner where Dad or Mom spend most of the day — the computer.

ABC was created to allow small children to play with the alphabet and with the computer, keying in letters and getting pictures as a reward. Each Hi-Res picture displays things beginning with the letter the child keyed in, and the word for that object indentifies it if the child is ready to read. And the little child fascinated by the red

---

Ann Mayeux takes time from the computer to care for her two small boys and husband. She has a degree in psychology and taught herself programming from the CoCo manual and THE RAINBOW. *Ann's winning Adventure program,* Time Travelers, *appears in* The Third Rainbow Book of Adventures.

CLOUD
CAR
C
CAT
S
E
M. H. Marsden

button will not stop the play because the BREAK key has been disabled. The child *can push it* to his/her heart's content and Mommy won't grumble.

Once the program is typed or loaded in and run, the title screen will appear and the *ABC* song will play. Then a screen of instructions will appear, explaining that the child need only press any letter key and the computer will display a picture representing the letter. Once a picture is completed, the child can again press any key to begin play. To stop the program press reset.

(Questions about this program may be addressed to the author at 433-A Alaska Drive, Petaluma, CA 94952. Be sure to include an SASE when writing for a reply.) ☐

110	82	1080	223	2000	252
290	82	1200	104	2070	252
470	155	1290	172	2170	204
560	80	1420	162	2270	181
650	85	1510	93	2350	134
730	26	1620	224	2420	213
830	26	1690	153	2520	160
910	30	1810	91	END	198
1000	92	1900	19		

The listing: ABC

```
10 ' A*B*C
20 ' BY ANN B. MAYEUX
30 ' KEY WEST, FL
40 POKE &HF8,&H32:POKE &HF9,&H62
:POKE &HFA,&H1C: POKE &HFB,&HAF:
POKE &HFC,&H7E:POKE &HFD,&HAD:PO
KE &HFE,&HA5:POKE &H19A,&H39:POK
E &H19B,&H0:POKE &H19C,&HF8:POKE
 &H19A,&H7E
50 FOR K=1 TO 2:NEXT
60 CLS:PRINT@204,"A*B*C":PRINT@3
28,"BY ANN B.MAYEUX":PRINT@358,"
FOR DAVID AND LANDRY"
70 PLAY"L6CCGGAAL3GL6FFEEL12DDDD
L3CL6GGL3FL6EEL3DL12GGGL3FL6EEL3
DL6CCGGAAL3GL6FFEEDDL2C":FORT=1T
O999:NEXT:CLS
80 AL$="U6E3F3D2NL6D4BR5":B$="U9
R3F2G2L3R4F2G3L3BR11":C$="U9R6BD
9L6BR11":D$="U9R4F2D5G2L4BR11":E
$="U9R6BD4L6D5R6BR5":F$="U9R6BD5
L6D4BR11"
90 G$="U9R6BD4NL2D5L6BR11":H$="U
9D4R6U4D9BR5":I$="NU9BR6":J$="NU
2R6NU9BR5":K$="U9BR6G6E3F3D3BR5"
:L$="NU9R6BR5":M$="U9F4E4D9BR5"
100 N$="U9D2F6DNU9BR5":O$="U9R6D
9L6BR11":P$="U9R6D5L6D4BR11":Q$=
"U9R6D9NF3L6BR11":R$="U9R6D4L6R3
F3D2BR5":S$="R6U5L5U4R5BD9BR5"
110 T$="BR3U9L3R6BD9BR5":U$="NU9
R6NU9BR5":V$="BU9D6F3E3U6BD9BR5"
:W$="NU9E4F4NU9BR5":X$="M+6,-9BL
6M+6,9BR5":Y$="BR3U4H3U2BR6D2G3D
4BR8":Z$="BU9R6D2G6DR6BR5"
120 CLS:PRINT@100,"WE HAVE A PIC
TURE FOR EACH  LETTER OF THE ALP
HABET;JUST TYPETHE LETTER YOU WA
NT TO SEE.":PRINT"   AFTER THE P
ICTURE IS COMPLETEYOU CAN SEE AN
OTHER PICTURE BY  TYPING IN ANOT
HER LETTER."
130 PMODE3,1:A$=INKEY$
140 IFA$="A"THEN410
150 IFA$="B"THEN510
160 IFA$="C"THEN590
170 IFA$="D"THEN680
180 IFA$="E"THEN750
190 IFA$="F"THEN820
200 IFA$="G"THEN900
210 IFA$="H"THEN1020
220 IFA$="I"THEN1100
230 IFA$="J"THEN1130
240 IFA$="K"THEN1220
250 IFA$="L"THEN1340
260 IFA$="M"THEN1410
270 IFA$="N"THEN1490
280 IFA$="O"THEN1560
290 IFA$="P"THEN1680
300 IFA$="Q"THEN1780
310 IFA$="R"THEN1890
320 IFA$="S"THEN2020
330 IFA$="T"THEN2100
340 IFA$="U"THEN2190
350 IFA$="V"THEN2250
360 IFA$="W"THEN2360
370 IFA$="X"THEN2440
380 IFA$="Y"THEN2490
390 IFA$="Z"THEN2550
400 GOTO130
410 PCLS2:SCREEN1,0:PLAY"L6C"
420 DRAW"C3BM0,70R255C2":PAINT(1
00,30),3,3:DRAW"BM10,50M30,20M50
,50BM20,35R20C4"
430 CIRCLE(150,30),50,2,.25,.3,.
05:DRAW"C2BM150,30L20F20R20H20F1
0R30H8R10F10L10H10BU8E12R4D15C4"
440 FORH=120TO170STEP10:PSET(H,2
7,2):NEXTH:CIRCLE(60,145),45,,.8
5,.25,.72:CIRCLE(72,157),35,,.8,
.3,.65
450 DRAW"C2BM120,65XAL$;XI$;XR$;
XP$;XL$;XAL$;XN$;XE$;C4":CIRCLE(
65,138),13,,1.3,.2,.05:DRAW"BM75
,141R5G4F6L5D6H6"
460 DRAW"BM78,138R45E10G10F15G5R
5F5E5R5H20E5G5R65E3U9H3G3L7H3G3L
```

```
14H3G3U5E6R3U3E6R3U3E6R3U3E6R3U5
H10L3D5G25"
470 CIRCLE(150,105),10,,1.2,.3,0
:CIRCLE(150,105),5,4:LINE(140,10
5)-(53,110),PSET:PAINT(100,115),
1,4:PAINT(65,138),1,4
480 DRAW"BM70,180XAL$;XL$;XL$;XI
$;XG$;XAL$;XT$;XO$;XR$;"
490 CIRCLE(215,110),10,,1.7:PAIN
T(215,110),4,4:CIRCLE(228,110),1
0,,1.7:PAINT(232,110),4,4
500 DRAW"BM210,85F15U15E10D10G10
":PAINT(230,87),1,4:DRAW"BM200,1
50XAL$;XP$;XP$;XL$;XE$;":GOTO130
510 PCLS:SCREEN1,0:PLAY"L6C"
520 DRAW"C3BM0,100R255":PAINT(10
0,30),3,3:CIRCLE(190,170),90,,.6
:PAINT(240,180),3,3
530 DRAW"C1BM200,10D40R20E5U10H5
L20R17E5U10H5L17C2BM140,140R90D1
5G5L65H20R50U74R2D74C4BM185,70M1
40,135R45U65":PAINT(150,130),4,4
540 PAINT(180,145),2,2:DRAW"BM19
9,68M230,135L31U67":PAINT(220,13
0),4,4
550 DRAW"BM5,31M26,41R4H6U10F5H6
U10F5H6U10F29D8G4E2R4E2U3E4R5F4D
2R4GL3D2R3FL4D2G2L3G9L2GL13HL6M5
,31":PAINT(40,36),2,4:PSET(64,39
)
560 CIRCLE(50,100),15,2:PAINT(50
,100),2,2:DRAW"BM48,114G4F4U8F2D
10F5D7G8":CIRCLE(75,75),13:PAINT
(75,75),4,4:DRAW"BM73,85G4F4U8F2
D15G5D10"
570 CIRCLE(115,45),16,1:PAINT(11
5,45),1,1:DRAW"BM113,60G4F4U8F2D
10F5D7G8"
580 DRAW"C2BM25,72XB$;XI$;XR$;XD
$;BM170,180XB$;XO$;XAL$;XT$;C4":
DRAW"BM15,160XB$;XAL$;XL$;XL$;XO
$;XO$;XN$;XS$;":GOTO130
590 PCLS:SCREEN1,1:PLAY"L6G"
600 CIRCLE(70,35),30,6,.77,.07,.
7:CIRCLE(115,32),27,6,.9,.65,.4:
CIRCLE(80,20),20,6,.9,.47,0
610 DRAW"BM0,10XC$;XL$;XO$;XU$;X
D$;"
620 DRAW"C6BM0,99R255C5":PAINT(1
00,100),6,6:CIRCLE(40,160),25,,1
,.1,.9:CIRCLE(40,160),17,,1,.1,.
9:DRAW"BM59,145G7BD16F7C8":PAINT
(19,160),5,5
630 DRAW"C7BM70,90R25E20R25F20R2
5D25L115U25C8":PAINT(100,90),7,7
:LINE(115,72)-(97,90),PSET:LINE-
(97,113),PSET:LINE-(130,113),PSE
T:LINE-(130,72),PSET:LINE-(115,7
2),PSET
640 DRAW"BM97,90R33BM133,72R5M15
8,90L25U18C5BM110,143XC$;XAL$;XR
$;C8"
650 PAINT(112,80),5,8:PAINT(138,
80),5,8:CIRCLE(85,115),10:CIRCLE
(165,115),10
660 CIRCLE(180,150),15:PAINT(180
,160),5,8:CIRCLE(195,165),25,,.9
,.72,.55:CIRCLE(193,165),15,,1,.
15,.45::PAINT(195,165),5,8
670 DRAW"BM170,168R10BM175,148R2
BF4D2G2E2F2BR2BU8R2BM169,140U5F4
BR14E4D5C5BM210,190XC$;XAL$;XT$;
C8":GOTO130
680 PCLS:SCREEN1,1:PLAY"L6G"
690 LINE(48,17)-(55,63),PSET,BF:
CIRCLE(55,40),28,,.9,.75,.25:CIR
CLE(55,40),20,,.9,.75,.25:PAINT(
80,40),8,8
700 DRAW"C6BM150,10R90D130L90U13
0BF10ND120R70D120L130C8":CIRCLE(
170,70),5
710 CIRCLE(75,140),25,,1,.4,.1:C
IRCLE(75,107),19,,.9:DRAW"BM58,1
04H2L2G4D17F2R4E2U17BR33E2R2F4D1
7G2L4H2U17":PAINT(54,117),8,8:PA
INT(95,117),8,8
720 CIRCLE(75,115),8:CIRCLE(75,1
10),3,,.9:CIRCLE(68,105),3,6,1.2
:CIRCLE(82,105),3,6,1.2
730 CIRCLE(65,156),11:CIRCLE(85,
156),11:DRAW"BM50,145M35,150R15"
:CIRCLE(75,170),16,6,.6:CIRCLE(7
5,170),12,6,.6
740 DRAW"BM58,191XD$;XI$;XS$;XH$
;BM15,135XD$;XO$;XG$;BM176,130XD
$;XO$;XO$;XR$;":GOTO130
750 PCLS:SCREEN1,1:PLAY"L6A"
760 DRAW"BM0,90E75D166BM5,70U10E
10BD5G10D5E10BE7M+9,-20BG9M+9,4B
E10U10BE8E10G5D10"
770 LINE(200,5)-(215,60),PSET,BF
:LINE(215,5)-(245,20),PSET,BF:LI
NE(215,60)-(245,45),PSET,BF:LINE
(215,25)-(240,40),PSET,BF
780 CIRCLE(90,110),30,6,1,.1,.9:
CIRCLE(115,102),23,6,1.3,.6,.1:C
IRCLE(150,130),50,6,.8,.6,.5:PAI
NT(100,110),6,6:'
790 CIRCLE(115,102),23,7,1.3,.6,
.2:CIRCLE(45,110),20,6,1,0,.4:CI
RCLE(45,110),30,6,1,0,.4:'
800 DRAW"C6BM30,120G8":PAINT(40,
130),6,6:LINE(105,140)-(140,180)
,PSET,BF:LINE(195,140)-(160,180)
,PSET,BF:'
810 DRAW"BM196,120F10R5G2H5C8BM5
```

```
5,128R20D5L15H5":CIRCLE(75,110),
4:DRAW"BM100,191XE$;XL$;XE$;XP$;
XH$;XAL$;XN$;XT$;":PAINT(60,130)
,5,8:GOTO130
820 PCLS2:SCREEN1,0:PLAY"L6A"
830 DRAW"BM120,5R40D15L25D5R20D1
5L20D10L15U45":PAINT(125,9),4,4:
CIRCLE(190,170),99,3,.3:PAINT(20
0,170),3,3:DRAW"C2BM140,165XF$;X
R$;XO$;XG$;C4"
840 DRAW"BM120,90G15R100H15F15G1
5L70H15E15H30L25D25F40G10R10F10E
10R10H10U5BM190,90E30R25D25G40F1
0L10G10H10L10E10U5"
850 CIRCLE(135,90),15,,1.5,.5,0:
CIRCLE(175,90),15,,1.5,.5,0:CIRC
LE(175,85),6,,1.5:CIRCLE(135,85)
,6,,1.5:DRAW"BM147,90R15"
860 PAINT(195,90),1,4:PAINT(115,
90),1,4:PAINT(135,100),1,4:PAINT
(135,115),1,4
870 DRAW"BM20,150C1U120G12D60F12
U35E40BD55G25D50U20E20D9G20C4":P
AINT(15,50),1,1:PAINT(40,150),1,
1
880 CIRCLE(55,30),5:CIRCLE(47,36
),5:CIRCLE(63,36),5:CIRCLE(51,43
),5:CIRCLE(58,44),5
890 CIRCLE(48,100),9,,.7:CIRCLE(
66,100),9,,.7:CIRCLE(57,93),6,,1
.3:CIRCLE(57,107),6,,1.3:DRAW"BM
5,185XF$;XL$;XO$;XW$;XE$;XR$;XS$
;":GOTO130
900 PCLS:SCREEN1,1:PLAY"L3G"
910 CIRCLE(100,20),20,7,1,.1,.9:
DRAW"C7BM112,25R10L5D15C8"
920 DRAW"BM40,120R10D60L10U60BR7
0R10D60L10U60BM50,125R60D10L60U1
0BD49R60U10L60D10BU15M105,135BM6
0,165M110,145"
930 LINE(25,115)-(35,180),PSET,B
:DRAW"BM0,135R25U10L25BD50R25U10
L25":LINE(33,130)-(43,133),PSET,
BF:LINE(33,167)-(43,170),PSET,BF
940 LINE(125,115)-(135,180),PSET
,B:DRAW"BM128,130L13D5"
950 LINE(0,55)-(60,60),PSET,BF:D
RAW"C6BM0,80E20R10D20U20R30D30C8
"
960 FOR H=20TO40STEP6:CIRCLE(H,8
0),4,7:NEXTH:FORH=25TO35STEP5:CI
RCLE(H,86),4,7:NEXTH:CIRCLE(30,1
01),4,7
970 FORH=27TO33STEP5:CIRCLE(H,93
),4,7:NEXTH:FORH=50TO70STEP6:CIR
CLE(H,90),4,7:NEXTH:FORH=54TO66S
TEP6:CIRCLE(H,97),4,7:NEXTH:FORH
=58TO64STEP6:CIRCLE(H,104),4,7:N
EXTH:CIRCLE(60,112),4,7
980 CIRCLE(157,25),18,,.6::DRAW"
BM159,5D10H6D6R15U6G6U10":CIRCLE
(157,3),4:CIRCLE(165,3),4:PAINT(
157,25),8,8
990 CIRCLE(152,22),3,6:DRAW"BM17
4,25D60F50D10H5U10H20D80L5U60H3D
63L5U63H12D75L5U80H4D83L5U167":P
AINT(173,100),8,8
1000 DRAW"BM255,125L120D10R120BD
30L120D10R120":DRAW"BM0,50XG$;XR
$;XAL$;XP$;XE$;XS$;BM183,75XG$;X
I$;XR$;XAL$;XF$;XF$;XE$;":DRAW"B
M60,191XG$;XAL$;XT$;XE$;"
1010 GOTO130
1020 PCLS:SCREEN1,1:PLAY"L6F"
1030 LINE(200,120)-(190,180),PSE
T,BF:LINE(200,145)-(235,155),PSE
T,BF:LINE(235,120)-(245,180),PSE
T,BF
1040 CIRCLE(170,50),25:CIRCLE(16
2,45),13:PAINT(190,50),7,8:LINE(
180,35)-(235,30),PSET:LINE-(185,
65),PSET:PAINT(208,40),7,8
1050 CIRCLE(150,22),20,,.3:CIRCL
E(190,22),20,,.3:CIRCLE(225,30),
10,,.3:CIRCLE(245,30),10,,.3:CIR
CLE(235,20),5,,2.5:CIRCLE(235,40
),5,,2.5:PAINT(150,22),8,8:PAINT
(190,22),8,8
1060 LINE(10,80)-(100,180),PSET,
B:LINE(43,179)-(67,140),PSET,B:L
INE(20,165)-(35,145),PSET,B:LINE
(75,165)-(90,145),PSET,B:CIRCLE(
49,160),3
1070 FORH=20TO75STEP27:LINE(H,90
)-(H+15,110),PSET,B:NEXTH
1080 DRAW"C6BM10,80E45F45BD50L90
E15R60F15C8":PAINT(50,117),6,6:D
RAW"BM130,90XH$;XE$;XL$;XI$;XC$;
XO$;XP$;XT$;XE$;XR$;BM30,25XH$;X
O$;XU$;XS$;XE$;"
1090 GOTO130
1100 PCLS6:SCREEN1,1:PLAY"L6F":D
RAW"BM175,40R25D15L5D81R5D15L25U
15R5U81L5U15":PAINT(185,50),8,8
1110 CIRCLE(75,65),30,5,1,.4,.1:
DRAW"C5BM46,75R56C8":PAINT(75,65
),5,5:DRAW"BM46,75R56M75,150M46,
75":PAINT(75,130),8,8
```

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Color Connection for RSDOS, and OS-9 Connection are the best in communication software. All of the standard protocols are supported, including CompuServe Protocol B, XMODEM, and XON/XOFF. The auto dial feature for Hayes compatible and some Radio Shack modems is supported. Macros allow easy entry to often-used passwords and ID's. Communicate with confidence with either Color Connection, or OS-9 Connection 3.0.

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```
1120 DRAW"C5BM30,175XI$;XC$;XE$;
BR10XC$;XR$;XE$;XAL$;XM$;C8":GOT
O130
1130 PCLS3:SCREEN1,0:PLAY"L6E"
1140 DRAW"BM120,185R65U65L65D65H
25U65F25H25H35R64G32C1"
1150 DRAW"BM150,30M185,119L63H26
E41F11E10C4"
1160 CIRCLE(148,30),25,,1,.95,.5
5:CIRCLE(148,30),25,,1,.6,.9:CIR
CLE(148,20),35,,.2,.8,.7:PAINT(1
50,10),4,4:PAINT(150,40),2,4
1170 PAINT(140,130),2,4:PAINT(11
6,150),2,4:PAINT(85,70),2,4:PAIN
T(148,80),1,1
1180 CIRCLE(140,33),3,3:CIRCLE(1
56,33),3,3:CIRCLE(148,38),3:CIRC
LE(148,39),7,,1,.1,.45
1190 CIRCLE(146,160),10,,1,0,.5:
DRAW"BM156,160U20"
1200 FORH=0TO44STEP16:FORV=(142-
H)TO(142+H)STEP15:CIRCLE(V,68+H)
,3,2:NEXTV:NEXTH
1210 DRAW"C2BM15,90XJ$;XAL$;XC$;
XK$;BM26,105XI$;XN$;BM20,120XT$;
XH$;XE$;BM20,135XB$;XO$;XX$;C4":
GOTO130
1220 PCLS:SCREEN1,1:PLAY"L6E"
1230 DRAW"C6BM99,135D30U10M124,1
35BD30M109,150BM40,5M15,30M40,70
M65,30M40,5C8":PAINT(40,30),6,6
1240 DRAW"BM40,70D6R3D3H3D4G2D3F
5R3U3G4D5":CIRCLE(40,100),11,,.6
:PAINT(40,100),8,8:CIRCLE(40,100
),7,5,.6:PAINT(40,100),5,5
1250 LINE(40,105)-(42,125),PSET,
BF:LINE(41,118)-(50,121),PSET,BF
1260 CIRCLE(180,160),30,,1,.1,.8
:CIRCLE(146,182),23,,.3,0,.9:PAI
NT(146,182),8,8
1270 LINE(160,140)-(175,70),PSET
:LINE-(215,160),PSET:LINE-(255,1
78),PSET:LINE-(188,183),PSET:PAI
NT(175,100),8,8
1280 CIRCLE(164,73),18,,.6:LINE(
170,62)-(176,55),PSET:LINE-(179,
75),PSET:PAINT(165,70),8,8
1290 CIRCLE(156,119),10,,.5:DRAW
"BM167,125L12D6F5R4U12":PAINT(15
6,119),8,8:PAINT(156,129),8,8
1300 CIRCLE(164,107),9,,.6:PAINT
(164,107),8,8:PSET(155,117,6):CI
RCLE(159,70),2,6:DRAW"BM50,50M16
4,107BM60,10XK$;XI$;XT$;XE$;BM17
0,50XK$;XAL$;XN$;XG$;XAL$;XR$;XO
$;XO$;BM25,147XK$;XE$;XY$;"
1310 PSET(155,117,6):CIRCLE(159,
70),2,6
1320 LINE(50,50)-(164,107),PSET
1330 GOTO130
1340 PCLS3:SCREEN1,0:PLAY"L12D"
1350 LINE(170,10)-(185,90),PSET,
BF:LINE(185,90)-(230,75),PSET,BF
1360 LF$="R60L40E13R40F13G13L40H
13":MF$="R50L25U10E30D25E20D20F1
5G15D20H20D25H30U10"
1370 DRAW"S6C2BM50,170XLF$;S4BM1
60,140XMF$;C4A1BM60,2XMF$;A0BM10
,130XLF$;"
1380 CIRCLE(140,110),20,,.8:CIRC
LE(140,103),6:CIRCLE(140,117),6:
PAINT(140,110),4,4:CIRCLE(122,11
0),10:DRAW"C3BM124,110R40C4"
1390 PAINT(110,175),1,2:PAINT(21
0,145),1,2:PAINT(55,52),1,4:PAIN
T(50,135),2,4
1400 DRAW"C3BM97,184XL$;XE$;XAL$
;XV$;XE$;XS$;C2BM101,137XL$;XAL$
;XD$;XY$;XB$;XU$;XG$;C4":GOTO130
1410 PCLS:SCREEN1,1:PLAY"L12D"
1420 DRAW"C6BM0,90E50F20G10H10G1
0H10BR40F60H20E60F15L5H5G10H5L5B
R30F30G30E55F15":CIRCLE(80,140),
12,,1,.5,0:DRAW"BM93,140D20F10H1
0L24F8H8U20D20H10U18E8R11F6C8":C
IRCLE(92,168),14,6,.6,.1,.5
1430 CIRCLE(82,25),22,6,1,.2,.8:
CIRCLE(105,24),30,6,1,.38,.62
1440 PAINT(100,110),7,6:PAINT(10
0,0),6,6
1450 DRAW"BM73,165D26R8U18H8":PA
INT(75,180),8,8
1460 DRAW"BM160,160U40F20E20D40L
10U20G10H10D20L10":PAINT(165,155
),8,8
1470 DRAW"C5BM90,25XM$;XO$;XO$;X
N$;":DRAW"BM5,100XM$;XO$;XU$;XN$
;XT$;XAL$;XI$;XN$;XS$;":DRAW"BM9
5,190XM$;XAL$;XI$;XL$;XB$;XO$;XX
$;C8"
1480 GOTO130
1490 PCLS:SCREEN1,1:PLAY"L12D"
1500 CIRCLE(160,88),35,,.37:PAIN
T(160,88),7,8
1510 FORH=55TO170STEP5:LINE(H,60
)-(H+95,140),PSET:LINE(H+95,60)-
(H,140),PSET:NEXTH:CIRCLE(160,10
0),50,7,.7:PAINT(160,65),6,7
1520 CIRCLE(160,88),35,6,.37:DRA
W"C5BM10,60U50F50U50"
1530 FORT=1TO30:H=RND(180):V=RND
(160):PSET(H,V):NEXTT
1540 DRAW"C7BM235,191U45L150H25R
65BR60R50U60H65R20F15U25R10D20F3
```

```
0E15C8":PAINT(250,100),8,7
1550 DRAW"C5BM185,140XN$;XE$;XS$
;XT$;BM120,30XN$;XI$;XG$;XH$;XT$
;C8":GOTO130
1560 PCLS:SCREEN1,1:PLAY"L12D"
1570 CIRCLE(210,30),25:CIRCLE(21
0,30),10:PAINT(210,10),8,8
1580 DRAW"BM0,175R25H10U80E15R50
H10L45G10U45E20L9G20D40H7":PAINT
(1,100),7,8
1590 CIRCLE(50,50),20,,.8,.9,.7:
CIRCLE(50,28),17,,.8:CIRCLE(44,2
8),8,,1.1:CIRCLE(56,28),8,,1.1:C
IRCLE(65,48),10,,1.2,.3,.7:CIRCL
E(35,48),10,,1.2,.9,.3:CIRCLE(45
,28),4,6:CIRCLE(56,28),4,6:CIRCL
E(50,36),3,7
1600 PAINT(50,62),5,8:DRAW"C5BM4
0,60R20C8"
1610 DRAW"BM77,40XO$;XW$;XL$;BM1
2,90R70F80R100":PAINT(60,160),8,
8
1620 CIRCLE(135,110),33,6,.7,.6,
.8::CIRCLE(145,95),10,6,.8,0,.8:
CIRCLE(175,95),20,6,.6,.5,.9:CIR
CLE(192,95),10,6,.8,0,.8:CIRCLE(
220,95),20,6,.6,.5,.9:CIRCLE(230
,95),9,6,1,.2,.8:DRAW"C6BM235,10
0R5E10R5D95L74H87R15E6C8":PAINT(
200,130),6,6
1630 DRAW"BM125,115C5XO$;XC$;XE$
;XAL$;XN$;C8"
1640 LINE(220,150)-(255,155),PSE
T:LINE-(225,160),PSET:LINE-(255,
175),PSET:LINE-(225,167),PSET:LI
NE-(245,185),PSET:LINE-(220,170)
,PSET:LINE-(220,185),PSET:LINE-(
210,165),PSET
1650 LINE-(200,185),PSET:LINE-(2
00,170),PSET:LINE-(175,185),PSET
:LINE-(195,167),PSET:LINE-(165,1
75),PSET:LINE-(195,160),PSET:LIN
E-(165,155),PSET:LINE-(200,150),
PSET
1660 CIRCLE(210,135),22,,1.2,.3,
.2:CIRCLE(204,140),5,,1.2:CIRCLE
(216,140),5,,1.2:DRAW"BM207,145R
6D3G3H3U3":PAINT(210,135),8,8
1670 DRAW"C5BM170,190XO$;XC$;XT$
;XO$;XP$;XU$;XS$;C8":GOTO130
1680 PCLS:SCREEN1,1:PLAY"L3C"
1690 DRAW"BM1,1R94D80L94U80BF9R7
5D60L75U60BM10,98XP$;XI$;XC$;XT$
;XU$;XR$;XE$;BM105,30XP$;XU$;XM$
;XP$;XK$;XI$;XN$;":PAINT(4,4),6,
8
1700 CIRCLE(45,47),27,,.8:PAINT(
50,50),8,8:CIRCLE(45,47),9,7,2.4
:CIRCLE(45,47),18,7,1.2
1710 DRAW"C6BM42,37U11E10D5G5D11
L5":PAINT(45,33),6,6
1720 LINE(100,191)-(70,130),PSET
:LINE-(205,125),PSET:LINE-(255,1
91),PSET
1730 DRAW"BM155,165L10M162,191L2
2M110,140R20":CIRCLE(140,155),23
,,.8,.7,.15
1740 CIRCLE(135,154),10,,1,.74,.
15:LINE(134,145)-(142,160),PSET:
PAINT(130,150),6,6
1750 DRAW"C8BM170,150E5R75D10L8U
10D10L10U10D10L58H4L3U1R3E5D4F2G
2D1"
1760 PAINT(245,150),7,8:PAINT(23
5,150),6,8:PAINT(190,150),8,8
1770 DRAW"BM43,190XP$;XAL$;XP$;X
E$;XR$;BM185,140XP$;XE$;XN$;XC$;
XI$;XL$;":GOTO130
1780 PCLS:SCREEN1,1:PLAY"L6G"
1790 DRAW"BM134,37R10F22L10H22":
PAINT(142,43),8,8:CIRCLE(135,30)
,30:CIRCLE(135,30),20:PAINT(135,
5),8,8
1800 DRAW"BM25,35XQ$;XU$;XI$;XL$
```

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```
;XT$;BM195,10XQ$;XU$;XE$;XE$;XN$
;"
1810 LINE(5,50)-(100,160),PSET,B
:FORH=15TO95STEP15:LINE(H,60)-(H
,150),PSET:NEXTH:FORV=60TO155STE
P15:LINE(15,V)-(90,V),PSET:NEXTV
1820 FORH=20TO90STEP30:FORV=65TO
145STEP30:PAINT(H,V),6,8:NEXTV:N
EXTH:FORH=35TO75STEP30:FORV=80TO
160STEP30:PAINT(H,V),7,8:NEXTV:N
EXTH
1830 CIRCLE(220,50),20:CIRCLE(22
0,60),30,,.9:PAINT(220,85),8,8:C
IRCLE(220,90),30,7,.8,.5,0:DRAW"
C7BM190,90D80R20U100BR20D95L20R2
0D5R20U80C8"
1840 PAINT(205,87),7,7:PAINT(235
,87),7,7:PAINT(220,140),8,7
1850 DRAW"BM207,35R26U15G5H4G4H4
G4H5D15":FORH=209TO233STEP5:CIRC
LE(H,28),3:NEXTH
1860 CIRCLE(212,50),3,6:CIRCLE(2
28,50),3,6:PSET(220,55):CIRCLE(2
20,60),5,7,.3
1870 DRAW"C5BM210,100R20L10D30H1
0F10E10C8"
1880 GOTO130
1890 PCLS3:SCREEN1,0:PLAY"L6G"
1900 LINE(0,130)-(255,191),PRESE
T,BF
1910 LINE(93,50)-(99,10),PSET,BF
:LINE(99,10)-(110,16),PSET,BF:LI
NE(99,28)-(110,34),PSET,BF:CIRCL
E(110,22),9,,1,.75,.25:CIRCLE(11
0,22),14,,1,.75,.25
1920 LINE(115,32)-(125,50),PSET:
LINE-(118,50),PSET:LINE-(109,34)
,PSET:PAINT(120,47),4,4:PAINT(12
1,22),4,4
1930 LINE(38,110)-(52,40),PSET,B
F:LINE(52,40)-(45,5),PSET:LINE-(
38,40),PSET:PAINT(45,20),4,4:DRA
W"BM38,95G15R17D5R10U5R17H15C2":
PAINT(36,102),2,4:PAINT(54,102),
2,4
1940 FORH=42TO48STEP3:V=RND(30):
LINE(H,114)-(H,115+V),PSET:NEXTH
1950 DRAW"BM41,95R8U6L8BU8U6D6R4
U6R4D6BU14L8U6R8L4D6C4"
1960 FORC=90TO150STEP15:CIRCLE(2
55,160),C,,1,.5,.75:NEXTC:DRAW"B
M104,160R62"
1970 PAINT(106,155),4,4:PAINT(25
1,29),2,4:PAINT(252,45),1,4:PAIN
T(160,155),3,4
1980 CIRCLE(210,135),16,2,1,.9,.
6:CIRCLE(210,165),25,2,.9,.8,.7:
DRAW"C2BM199,128U20E4F4D16R6U8E8
R7D5G7D10C4"
1990 PAINT(210,135),2,2:PAINT(21
0,165),2,2:CIRCLE(205,135),3:CIR
CLE(215,135),3:DRAW"BM210,140F2L
4E2D4G2E2F2"
2000 CIRCLE(200,180),6:CIRCLE(22
0,180),6
2010 DRAW"C3BM10,155XR$;XO$;XC$;
XK$;XE$;XT$;C2BM165,11XR$;XAL$;X
I$;XN$;XB$;XO$;XW$;C3BM130,185XR
$;XAL$;XB$;XB$;XI$;XT$;C4":GOTO1
30
2020 PCLS3:SCREEN1,0:PLAY"L3F"
2030 LINE(0,105)-(255,191),PRESE
T,BF:DRAW"C2BM255,110L255BD30R10
0G51BR80E51R75
2040 DRAW"BM40,40NU40ND40NR40NL4
0NE30NF30NG30NH30BM80,32XS$;XU$;
XN$;C4":CIRCLE(40,40),25:PAINT(4
0,40),2,4
2050 DRAW"BM200,50R20F20D20G20L2
0H20U20E20C2BM195,45XS$;XI$;XG$;
XN$;":PAINT(210,80),4,4:DRAW"BM1
90,86XS$;XT$;XO$;XP$;":LINE(207,
112)-(213,181),PSET,BF
2060 DRAW"C4BM95,134F10BE40F16D4
U4R4BM80,190XS$;XN$;XAL$;XK$;XE$
;"
2070 CIRCLE(120,110),29,,.9,.3,.
9:CIRCLE(120,110),17,,1,.3,.9:CI
RCLE(120,148),29,,.9,.7,.6:CIRCL
E(120,145),17,,.9,.7,.5:CIRCLE(1
43,102),12,,1.1,.7,.6:PAINT(145,
110),4,4
2080 CIRCLE(146,100),2,1:CIRCLE(
140,104),2,1
2090 DRAW"BM5,130XS$;XT$;XR$;XE$
;XE$;XT$;":GOTO130
2100 PCLS:SCREEN1,0:PLAY"L6E"
2110 DRAW"BM0,123C3R255C4":PAINT
(100,20),3,3
2120 LINE(80,85)-(170,155),PSET,
BF:DRAW"C2BM177,100R35D20R30D35L
65U55":LINE(180,105)-(210,120),P
SET,B:DRAW"BM130,190C3XT$;XR$;XU
$;XC$;XK$;C2"
2130 PAINT(190,135),2,2:PAINT(23
0,145),2,2:DRAW"BM120,135U20L10U
10R30D10L10D20L10C4":PAINT(125,1
25),2,2
2140 CIRCLE(100,155),15:CIRCLE(1
50,155),15:CIRCLE(226,155),15:CI
RCLE(197,155),15
2150 DRAW"BM0,40F25D70G20L5D3R20
E5F10E10F8R20H10L5H8U65E30U40L7D
30G25U55L12D50H15U35L7D30H20":PA
```

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Cassette 'Y' Cable - Connect a 26-3028 Hi-Res Joystick interface & Tape Recorder to CoCoIII .	$19.95
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No more Deluxe RS-232 paks left to hook up ptr & modem? Buy our RS-232 "Y" Cable (4 pin)	$24.95
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MAGNAVOX 8505/8515/8CM643 Analog RGB cable .	$24.95
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40 Pin Dual "Y" Cable - Hook up a Disk with a Voice Pak, Word Pak, CoCo Max, etc.	$29.95
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OTHER GOOD STUFF ...

5 1/4" Diskettes in any quantity	49 cents
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CoCoII/CoCoIII KEYCAPS - Replace worn keys! .	$4.99
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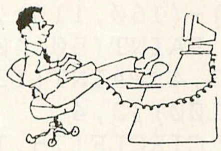
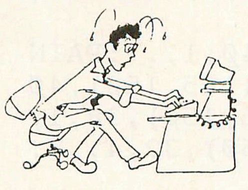
"D" Rev motherboard w/o socketed chips	$16.95
Video Clear - This cable will reduce TV interference created by CoCo!	$19.95
CoCo III keyboard - upgrade your CoCo II keyboard! "Package" deal w/FKEYS III($24.95) software	$39.95
HDS Controller w/1.1 ROM (SAVE$20)	$79.95
Super Controller - Up to 4 DOSs by a POKE ..	$99.95
1200 Baud Modem(Hayes compatible) Auto-dial/answer $139.95. Req's Modem cable (4pin or DB25) ..	$19.95
MAGNAVOX 8505 RGB Analog monitor	$249.95
SONY KV-1311 CR Analog monitor w/cable	$499.95

Breaking your back typing on your CoCo???





Sit back and relax with a Spectrum keyboard extender cable! $39.95

Now you can extend your present keyboard away from your CoCoII/CoCoIII! Easier typing & requires no soldering! You also have the option to leave your present keyboard intact & hook up a second board for remote operation! Spectrum Keyboard extender cable w/EXTERNAL CoCoII keyboard $49.95

Design by Marty Goodman, so you know it's quality!

SUPER CHIP -SALE- ...

2764 EPROM ....$4.95 27128 EPROM	$6.95
6821 Standard PIA ~~$9.95~~ Closeout price!	$6.95
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6847 VDG Chip ~~$19.95~~ Closeout price!	$12.95
6809E CPU Chip ~~$19.95~~ Closeout price!	$12.95
CoCo III Multipak - "NEW" PAL chip (For Gray and White 26-3024 models ONLY)	$19.95
Basic ROM 1.3 (Newest version)	$19.95
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Original SAM Chip (6883)	$29.95
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CoCo First Aid Kit - includes two PIA's, 6809E CPU and SAM Chips (BE PREPARED) Closeout price!	$49.95
EPROM Programmer - uses 2716s up to 27512s! Super fast programming! - See April '86 review .	$149.95
New! "Upgraded" CoCoIII 'GIME' chip	WRITE

COCO LIBRARY ...

A History of the CoCo / 1980-1986	$6.95
CoCo Memory Map Reg. ~~$16.95~~ Now only	$9.95
New! 200 MORE Pokes,Peeks 'N Execs	$9.95
Basic Programming Tricks Revealed ~~$14.95~~	$9.95
500 Pokes, Peeks 'N Execs	$16.95
300 CoCoIII POKES	$19.95
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CoCo III DISK DRIVE 0 - (Includes CoCoIII Software Bonanza Package - a $150 plus value!!!) ...	$239.95
2400 Baud Modem (Great for Delphi & CIS) ..	$249.95
512K COLOR COMPUTER III (Includes CoCoIII Software Bonanza Package - a $150 plus value!!!) ...	$299.95

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NYS Residents add Sales Tax
See our other ad on page 17 !!!

64K RAM CHIPS ~~$19.95~~ $12.95

```
INT(30,70),4,4
2160 FORH=7TO99STEP12:CIRCLE(H,1
0),13,2:PAINT(H+2,10),1,2:CIRCLE
(H+3,35),13,2:PAINT(H+5,35),1,2:
NEXTH
2170 FORH=18TO80STEP12:CIRCLE(H,
59),12,2:PAINT(H+2,52),1,2:NEXTH
2180 DRAW"C3BM15,190XT$;XR$;XE$;
XE$;C4":GOTO130
2190 PCLS3:SCREEN1,0:PLAY"L6E"
2200 CIRCLE(40,150),20,2,1,0,.5:
CIRCLE(40,150),10,2,1,0,.5:DRAW"
C2BM22,150U30R10D30BR17U30R10D30
C4":PAINT(40,165),2,2
2210 CIRCLE(125,90),85,1,.9,.5,0
2220 LINE(124,82)-(128,170),PSET
,BF:CIRCLE(114,170),18,,1,0,.5:C
IRCLE(114,170),10,,1,0,.5:LINE(9
4,170)-(104,170),PSET:PAINT(114,
183),4,4
2230 FORH=60TO210STEP42:CIRCLE(H
,90),22,1,.6,.5,0:NEXTH:PAINT(10
0,60),1,1
2240 LINE(124,10)-(128,17),PSET,
BF:DRAW"C2BM150,130XU$;XM$;XB$;X
R$;XE$;XL$;XL$;XAL$;C4":GOTO130
2250 PCLS:SCREEN1,1:PLAY"L3D"
2260 LINE(170,10)-(200,50),PSET:
LINE-(230,10),PSET:LINE-(215,10)
,PSET:LINE-(200,35),PSET:LINE-(1
85,10),PSET:LINE-(170,10),PSET
2270 CIRCLE(60,141),25,,.75,.92,
.56:CIRCLE(60,103),25,,.75,.46,.
06:CIRCLE(36,121),10,,1.6,.75,.2
5:CIRCLE(84,121),10,,1.6,.25,.75
:PAINT(60,141),8,8
2280 DRAW"C7BM53,131G2D5G3BR26H3
U5H3":LINE(60,145)-(56,135),PSET
:LINE-(64,135),PSET:LINE-(60,145
),PSET:LINE(55,130)-(65,131),PSE
T,BF:CIRCLE(45,150),8,,.9,.65,.1
2290 DRAW"BM65,25H3L6G3D3F3E4H3R
2D2":LINE(55,120)-(66,90),PSET,B
F:LINE(57,90)-(64,25),PSET,BF:LI
NE(53,44)-(68,46),PSET,B
2300 DRAW"C5BM58,37D100BR4U100C6
":LINE(5,124)-(135,127),PSET,B:L
INE(3,127)-(138,132),PSET,BF
2310 CIRCLE(200,160),25,8,.8,.8,
.7:DRAW"C8BM190,150U7H6R32G6D7":
PAINT(200,160),8,8
2320 DRAW"C6BM197,137L20H10U10R1
0F15U3H7U5E9R5F9D7E8R9F10D2G9L30
":PAINT(200,135),6,6
2330 FORH=178TO233STEP15:CIRCLE(
H,132),6,7,.4:PAINT(H,132),7,7:N
EXTH:DRAW"C7BM186,134G4D3F4E4U3H
4BR30G4D3F4E4U3H4":PAINT(186,136
),7,7:PAINT(216,136),7,7
2340 DRAW"BM180,132U8E2F3D6R4U6E
3F2D9BR16U8E2F3D8R4U8E3F2D8C8":P
AINT(182,128),7,7:PAINT(192,128)
,7,7:PAINT(213,128),7,7:PAINT(22
3,128),7,7:PSET(186,131,5):PSET(
216,131,5)
2350 DRAW"BM0,57XV$;XI$;XO$;XL$;
XI$;XN$;BM180,190XV$;XAL$;XS$;XE
$;BM168,100XV$;XI$;XO$;XL$;XE$;X
T$;XS$;":GOTO130
2360 PCLS2:SCREEN1,0:PLAY"L12GGG
"

2370 LINE(185,40)-(195,90),PSET:
LINE-(215,60),PSET:LINE-(235,90)
,PSET:LINE-(245,40),PSET
2380 LINE(20,20)-(180,25),PSET,B
F:LINE(30,25)-(35,120),PSET,BF:L
INE(170,25)-(165,120),PSET,BF:LI
NE(20,120)-(180,130),PSET,BF
2390 LINE(40,30)-(97,70),PSET,B:
LINE(103,30)-(160,70),PSET,B:LIN
E(40,75)-(97,115),PSET,B:LINE(10
3,75)-(160,115),PSET,B
2400 PAINT(50,40),3,4:PAINT(50,1
00),3,4:PAINT(130,40),3,4:PAINT(
130,100),3,4
2410 CIRCLE(75,140),40,1,.7:PAIN
T(75,140),1,1:CIRCLE(145,150),40
,1,.7,0,.5:CIRCLE(145,150),38,1,
.7,0,.5:CIRCLE(145,150),32,4,.7,
0,.5
2420 LINE(113,150)-(178,150),PSE
T:PAINT(145,155),4,4:FORH=120TO1
74STEP12:CIRCLE(H,156),2,3,.5:NE
XTH:FORH=130TO155STEP11:CIRCLE(H
,165),2,3,.5:NEXTH
```

One-Liner Contest Winner . . .

Here is an excellent one-liner for a long, lazy summer. Next year, I might write one called *Mower*, which will help keep this one in line.

The listing:

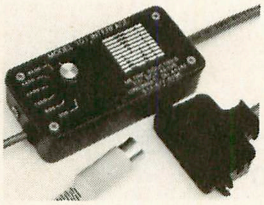
```
10 DIM R(255): PMODE 4: SCREEN 1
,0: PCLS: FOR K=0 TO 65535: X=RN
D(256)-1:R(X)=R(X)+1: PSET(X,192
-R(X)): NEXT
```

J. Frederick Toon
Lebanon, CT

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

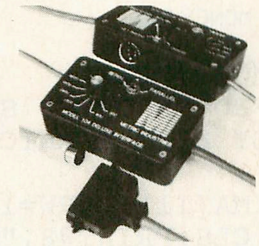
```
2430 DRAW"BM45,190XW$;XAL$;XT$;X
E$;XR$;XM$;XE$;XL$;XO$;XN$;BM65,
15XW$;XI$;XN$;XD$;XO$;XW$;":GOTO
130
2440 PCLS2:SCREEN1,0:PLAY"L3F"
2450 LINE(20,65)-(220,70),PSET,B
F:LINE(20,100)-(220,105),PSET,BF
:DRAW"C3BM5,5F40BU40G40"
2460 FORG=5TO45STEP6:LINE(5*G,65
-G)-(5*G+17,G+105),PSET,B:PAINT(
5*G+3,65),1,3:NEXTG
2470 LINE(20,180)-(90,170),PSET:
LINE(30,140)-(99,140),PSET:CIRCL
E(20,180),10,1:PAINT(20,180),1,1
:CIRCLE(30,140),10,1:PAINT(30,14
0),1,1
2480 COLOR4,1:DRAW"BM120,175XX$;
XY$;XL$;XO$;XP$;XH$;XO$;XN$;XE$;
":GOTO130
2490 PCLS2:SCREEN1,0:PLAY"L6EE"
2500 FORC=50TO160STEP6:CIRCLE(12
5,0),C,1:NEXTC:CIRCLE(120,105),5
5,3:PAINT(100,7),2,3
2510 FORC=55TO110STEP6:CIRCLE(12
0,105),C,1:NEXTC
2520 CIRCLE(70,105),30,3:CIRCLE(
170,105),30,3:CIRCLE(134,70),37,
3,1,.2,.05:PAINT(125,120),3,3
2530 LINE(88,83)-(155,127),PSET,
B:PAINT(120,110),2,4
2540 DRAW"BM110,95F10D10U10E10C2
BM60,150XY$;XE$;XL$;XL$;XO$;XW$;
BR15XY$;XAL$;XR$;XN$;C4":GOTO130
2550 PCLS:SCREEN1,1:PLAY"L3D"
2560 DRAW"BM50,30E2F2G2H2D10G4D4
0G40D5E5U5E10D50R3U38D3D36R3U39E
16D55R3U58R4D58R3U110R10E2U3H5L1
0R5U10G2F2E2H2"
2570 PSET(56,43,7)
2580 DRAW"C7BM175,80G15D3F4R3E6F
6E6G6F10D30R5U23R25F9D14R5U32H4R
6F4D4H8L2H4L5D9U9L9D7U7L7D8U8L4H
6G6E6H6G7E7H4G6E6H4L5U6F3G3C6"
2590 LINE(140,70)-(250,150),PSET
,B:LINE(0,90)-(100,165),PSET,B
2600 FORH=140TO250STEP15:LINE(H,
70)-(H,150),PSET:NEXTH:FORH=0TO1
00STEP15:LINE(H,90)-(H,165),PSET
:NEXTH
2610 DRAW"C8BM130,1R30G30R30BM18
0,60XZ$;XE$;XB$;XR$;XAL$;BM120,1
90XZ$;XO$;XO$;":GOTO130
```

Model 101 Interface $39.95



- Serial to parallel interface
- Works with any COCO
- Compatible with "Centronics" parallel input printers
- 6 switch selectable baud rates 300-600-1200-2400-4800-9600
- Small size 4" x 2" x 1"
- Comes complete with cables to connect to your computer and printer

Model 104 Deluxe Interface $51.95

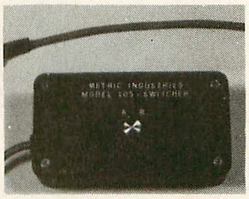


Same features as 101 plus
- Built in serial port for your modem or other serial device
- Switch between parallel output and serial output
- Size is 4.5" x 2.5" x 1.25"
- Comes complete with cables to connect to your computer and printer

Model 102 Switcher $35.95

- Connect to your COCO serial port and have 3 switch selectable serial ports
- Color coded indicator lights show switch position
- Lights also serve as a *power on* indicator for your COCO
- Heavy guage blue anodized aluminum cabinet with non-slip rubber feet

Model 105 Switcher $14.95



- Connects to your COCO to give you 2 switch selectable serial ports
- 3 foot cable to connect to your COCO's serial port
- The perfect item to use to connect a printer and a modem to your COCO
- Small in size, only 4.5 x 2.5 x 1.25

Cassette Label Program $6.95

- New Version - tape transferrable to disk - save and load labels from tape to disk
- Prints 5 lines of information on pin-feed cassette labels
- Menu driven, easy to use
- Standard, expanded and condensed characters
- Each line of text automatically centered.
- Label display on CRT, enabling editing before printing
- Program comes on tape and is supplied with 24 labels to get you started
- 16K ECB required

Other Quality Items

High quality 5 screw shell C-10 cassette tapes. **$7.50/dozen**

Hard plastic storage boxes for cassette tapes. **$2.50/dozen**

Pin-Feed Cassette Labels White **$3.00/100** Colors **$3.60/100** (specify red, blue, yellow, tan)

NEW! Cables for your COCO

- U.L. listed foil-shielded cable
- 2 Types: male/female extension cables (used between a serial device and existing cable) male/male cables (used between two serial devices such as a modem and one of our switchers).
- 3 ft./$3.95, 6 ft./$4.49, 10 ft./$5.59 Specify M/M or M/F and length.

The 101 and 104 require power to operate. Most printers can supply power to your interface. (Star, Radio Shack and Okidata are just a few that do - Epson and Seikosha do not). The interfaces can also be powered by an AC adaptor; Radio Shack model 273-1431 plugs into all models. If you require a power supply, add a "P" to the model number and add $5.00 to the price. (Model 101P $44.95, Model 104P $56.95).

The Model 101, 102, 104 and 105 work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Itoh, Seikosha, Panasonic and many others. They support BASIC print commands, word processors and graphic commands.

We manufacture these products - dealer inquiries are invited.

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Free shipping in the United States (except Alaska and Hawaii) on all orders over $50.00. Please add $2.50 for shipping and handling on orders under $50.00.
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School Days, School Days

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Math Help

16K
ECB

How Much Do You Have?

By Bill Bernico

"Mom, how much is 87 pennies and 12 nickels and eight dimes? Mom, how much is 14 quarters and nine nickels and 77 pennies and three dollar bills? Mom, how much . . ."

A few episodes like this, and you'll be ready to write your child a check and take all the change! Here's a better solution. Let your child load and run *Moneyjar*.

The screen lists various denominations of money. All you need to do is enter the amount of each particular denomination you have. If you have none, enter zero or press ENTER. The dollar value for that amount will appear in the right column.

When you're finished, a total amount will be displayed. Then a new message, accompanied by a beeping noise, will ask if you want to play again or quit.

Try entering extra-large amounts. After you have more than a million dollars, a little message will appear reminding you why banks were created.

The listing: MONEYJAR

```
10 'MONEY JAR
20 'FROM KROMICO SOFTWARE
30 'BY BILL BERNICO
40 '
50 DIMA(11):FORW=1TO11:READA(W):
NEXT:CLS:PRINT@8,"COUNT YOUR MON
EY":FORX=1024TO1055:POKEX,PEEK(X
)-64:NEXT:PRINT@34,"HOW MANY OF
EACH DO YOU HAVE":PRINT@75,"QUAN
TITY      AMOUNT":FORX=1088TO111
9:POKEX,PEEK(X)-64
60 NEXT:PRINT@96,"PENNIES":PRINT
@128,"NICKELS":PRINT@160,"DIMES"
:PRINT@192,"QUARTERS":PRINT@224,
"HALF-DOLLARS":PRINT@256,"$1 BIL
LS":PRINT@288,"$5 BILLS":PRINT@3
20,"$10 BILLS":PRINT@352,"$20 BI
LLS":PRINT@384,"$50 BILLS":PRINT
@416,"$100 BILLS
70 B=110:FOR C=1 TO 11:PLAY"O5T6
0B":PRINT@B,"";:LINEINPUTD$:D=VA
L(D$):POKEB+1029,32:E=E+A(C)*D:G
OSUB170:E$="$$####.##":H=(A(C)*D
)/100:PRINT@B+8,"";:PRINTUSINGE$
```

```
;H:POKEB+1041,32:B=B+32:NEXTC:PO
KE1491,32:POKE1523,32:PRINT@471,
STRING$(8,45):POKE1503,32
80 POKE1535,32:D$="$$######":C$=
"##":FORX=1472TO1490:POKEX,32:NE
XT:PRINT@480,"your ";:POKE1508,3
2:PRINT"moneyjar ";:POKE1517,32:
PRINT"total";:PLAY"O1T60CP3O2CP3
O3CP3O4CP3O5C":PRINT@500,"";:PRI
NTUSINGD$;F;:PRINT".";:PRINTUSIN
GC$;G;
90 DATA 1,5,10,25,50,100,500,100
0,2000,5000,10000:IF PEEK(1533)=
96 THEN POKE 1533,112
100 PRINT@32,"        TRY aGAIN O
R qUIT":PLAY"O4T60F":FORY=1TO300
:NEXT
110 A$=INKEY$
120 IFA$="Q"THEN CLS:LIST-30
130 IFA$="A"THEN RUN
140 PRINT@39,"TRY AGAIN OR QUIT"
:PLAY"O2T60F":FORY=1TO300:NEXT:G
OTO100
150 CLS:PRINT@230,"IF YOU HAVE T
HAT MUCH                MONEY, IT BEL
ONGS IN A               BANK - NOT A
JAR!  TRY               AGAIN.":FORX=
1TO5:PRINT@173,"OVERFLOW":FOR Y=
1TO100:NEXTY:PLAY"O5T60G":PRINT@
173,"overflow":FOR Y=1TO100:NEXT
Y:PLAY"O3T60G":NEXT
160 FORX=1TO2500:NEXT:RUN
170 F=INT(E/100):IFF>99999THEN15
0
180 G=E-100*F:RETURN
```

4K

Math Can Be Fun

By James E. Rittenhouse

Math Teacher is an addition and subtraction program intended for first and second graders and is designed to reinforce a positive attitude toward math.

A computer face appears on the screen and asks an unlimited series of "What is X+Y" type problems, rewarding correct responses with a smile and sympathetically frowning when given an incorrect answer.

The program keeps track of total questions asked and correct responses. The phrase `PRESS ENTER:INPUT` is placed throughout the program, creating pauses and allowing the child to proceed at his/her own pace.

Math Teacher is set up for addition problems, but it can be used for subtraction by making these changes:

```
100 PRINT @ 0, ″LET'S DO <SUBTRACTING>″
160 PRINT @ 32, ″WHAT IS″X-″″Y ;:INPUT A
180 IF A=X-Y THEN GOTO 300
190 IF AX-Y THEN GOTO 400
410 PRINT @ 362,X-″″Y″=″X-Y ;
```

And adding this line:

```
155 IF X<Y GOTO 150
```

The listing: `MATHTCHR`

```
1 REM*MATHTCHR
2 REM*BY J.E.RITTENHOUSE
3 GOTO 500
5 CLS(0)
10 FOR H=20 TO 43
20 SET (H,10,5)
30 SET (H,20,5)
40 NEXT H
50 FOR V=10 TO 20
60 SET(20,V,5):SET(43,V,5):NEXT
V
70 SET(31,15,8)
80 FOR H=28TO34:SET(H,17,4):NEXT
 H
90 SET(25,13,3):SET(38,13,3)
100 PRINT@0,"LET'S DO <ADDING>"
110 PRINT@32,"PRESS [ENTER]";:IN
PUT A$
145 T=T+1
150 X=RND(15):Y=RND(15)
160 PRINT@32,"WHAT IS"X"+"Y;:INP
UT A
180 IF A=X+Y THEN GOTO 300
190 IF A<>X+Y THEN GOTO 400
300 PRINT@356,"****THAT'S CORREC
T!****";
301 FOR X=89 TO 176
302 SOUND X,1:NEXT X
303 SET(27,16,4):SET (35,16,4)
310 R=R+1
320 PRINT@420,"THAT'S"R"CORRECT
OUT OF"T
330 PRINT@452,"PRESS [ENTER] FOR
 ANOTHER";:INPUT A$
350 GOTO 5
400 PRINT@360,"*****WRONG*****";
401 FOR P=176 TO 89 STEP-1
402 SOUND P,1:NEXT P
403 SET(27,18,4):SET (35,18,4)
410 PRINT@362,X"+"Y"="X+Y  ;
420 GOTO 330
500 CLS(0):S=128+16*(3-1)+0
510 FOR H=20 TO 43:SET(H,10,5)
520 SET(H,20,5):NEXT H
530 FOR V=10 TO 20:SET(20,V,5)
540 SET(43,V,5):NEXT V
550 SET(31,15,8)
560 FOR H=28 TO 34:SET(H,17,4):N
EXT H
```

```
570 SET(25,13,3):SET(38,13,3)
580 SET(27,16,4):SET(35,16,4)
590 PRINT@40,"math";CHR$(S);"can
";CHR$(S);"be";CHR$(S);"fun";
600 PRINT@393,"and";CHR$(S);"i";
CHR$(S);"can";CHR$(S);"help";
610 PRINT@458,"press";CHR$(S);"e
nter";CHR$(S);:INPUT R$
620 GOTO 5
```

Goodbye Flashcards

4K

By John Musumeci

Timetable can help you study for multiplication tests. Upon running, input the number you want to times by. You can enter any number from 1 to 9. Press ENTER and a times table will appear.

If you select 6, for example, the times table from 6x1=6 to 6x10=60 will be displayed. After studying, press ENTER for a test. Random numbers appear, which you multiply by 6. If you answer correctly, a random color is displayed, followed by another number. If you answer incorrectly, you will be informed, the screen will clear, and the times table will reappear for further studying.

The listing: TIMETABL

```
1 '****TIMETBLE****
2 '****************
3 '***WRITTEN BY***
4 '*JOHN MUSUMECI**
5 '*103-57 104 ST**
6 '**OZONE PARK,***
7 '***NEW YORK*****
8 '****11417*******
9 '**718-738 0212**
10 CLS
20 PRINT@11,"TIMES TABLE"
30 PRINT@64,"WHAT NUMBER-TO-TIME
S BY"
40 PRINT:PRINT:INPUT B
50 IF B<1 OR B>9 THEN 10
60 CLS
70 PRINT@11,"TIMES TABLE"
80 PRINT@43,"-----------"
90 PRINT:PRINT
100 FOR A=1 TO 10
110 C=B*A
120 PRINT B;"X";A;"=";C,:NEXT A
130 PRINT:PRINT
140 PRINT "PRESS <ENTER> FOR TES
T"
150 INPUT Z
160 CLS
170 A=RND(10)
180 PRINT@480,"PRESS '99' FOR NE
W NUMBER";
190 PRINT@75,A
200 PRINT@105,"X"
210 PRINT@107,B
220 PRINT@138,"----"
230 PRINT:PRINT
240 C=A*B
250 INPUT "ANSWER IS";F
260 IF F=C THEN PRINT "CORRECT":
FOR X=1TO460*3:NEXT X:SOUND 150,
1:R=RND(7)+1:CLS(R):FORX=1TO460*
3:NEXTX:GOTO160
270 IF F=99 THEN 10
280 PRINT"WRONG":FOR X=1TO460*3:
NEXTX:SOUND75,5:GOTO60
```

Letter Fun

Learning Your ABCs

4K

By James Dale Duncan

The following program is aimed at preschoolers and was designed to help develop the concept of alphabetical ordering.

Letter Getter displays the alphabet, in proper order, at the top of the screen. At the bottom is a scrambled alphabet. The flashing asterisk acts as the cursor and is moved by using the comma (,) and period (.) keys.

Pressing the Z key "gets" the letter beneath the cursor and takes it to the top of the screen. You then place the letter under its match in the correct row. When all the letters are correctly arranged, they flash and tones play. Along with the flashing letters, the number of moves used is displayed.

Note that, as written, if the cursor is moved to the extreme right or left, the cursor will wrap around and appear at the opposite end of the current row.

For those of you who jumped into CoCo's graphics head first, the text screen can be hard to deal with. A point that may help is shown in this program. In Line 120, L=PEEK(1056+G) looks at the cursor position 'G' + '1024', which is the difference between PRINT@ and the screen memory +32. This allows you to look at the row under the cursor and gives the ASCII number of whatever character is at that location. The result can be used in many ways.

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This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter/update salesman records, and update the SBAP inventory. **$59.95**

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Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

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Handles 45 accounts. Enters cash expenses as easily as checks. Handles 26 expense categories. Menu driven and user friendly. **$39.95**

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Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package. **$59.95**

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Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package. **$59.95**

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Consider this a text screen equivalent of the POINT or PPOINT commands.

The listing: LETRGETR

```
0 ' LETTER GETTER  COPYRIGHT (C)
  JAMES DALE DUNCAN  11/7/86
10 P=451:D=1:G=419:P1=131:W=0:M=
0
20 A$="DNUEPYCQLOSVAMHBRWZIJGTXF
K":B$="ABCDEFGHIJKLMNOPQRSTUVWXY
Z":C$="abcdefghijklmnopqrstuvwxy
z"
30 CLS:PRINT"*********LETTER*GET
TER**********":PRINT@67,B$;:PRIN
T@P,A$;
40 FORDD=32TO448STEP64:PRINT@DD+
62,CHR$(191)+CHR$(175);:PRINT@DD
+30,CHR$(175)+CHR$(191);:PRINT@D
D,CHR$(175)+CHR$(191);:PRINT@DD+
32,CHR$(191)+CHR$(175);:NEXT
50 G$=INKEY$:PRINT@G,CHR$(42);:F
ORJ=0TO50:NEXT:PRINT@G,CHR$(32);
:IFG$=","THENG=G-1ELSE IFG$="."T
HENG=G+1
60 IFG$="," OR G$="."THENM=M+1
70 IFG<419THEN G=444ELSE IF G>44
4THEN G=419
80 IF G$="Z"THEN GOSUB 110
90 IF G$=""THEN50
100 GOTO50
110 L=PEEK(1056+G):IFL<65 OR L>9
0 THENL=32
120 IF L=32 THEN RETURN
130 PRINT@G+32,CHR$(32);
140 G$=INKEY$:PRINT@P1,CHR$(L);:
FORJ=0TO50:NEXT:PRINT@P1,CHR$(32
);:IFG$=","THEN P1=P1-1ELSE IFG$
="."THEN P1=P1+1
150 IFG$="," OR G$="."THENM=M+1
160 IFP1<131THENP1=156ELSEIFP1>1
56THENP1=131
170 IFG$="Z"THEN190ELSE GOTO140
180 IFG$=""THEN140
190 IF PEEK(992+P1)<>96THEN210
200 PRINT@P1-32,CHR$(L);:IFL<>PE
EK(960+P1)THENPRINT@P1-32,CHR$(3
2);
210 IFL<>PEEK(960+P1)THENPRINT@G
+32,CHR$(L);
220 IFL=PEEK(960+P1)THENW=W+1
230 IFW=26THEN250
240 RETURN
250 PRINT@225,"YOU FINISHED IN "
;M;" MOVES.";:PRINT@289,"PRESS A
NY KEY TO PLAY AGAIN.";
260 G$=INKEY$:PRINT@99,C$;:SOUND
180,1:PRINT@67,C$;:SOUND200,1:PR
INT@99,B$;:SOUND220,1:PRINT@67,B
$;:SOUND240,1:IFG$=""THEN260
270 RUN
```

16K ECB

Wipe Out Letters

By Bill Smith

Letter Cruncher puts to practice hand/eye coordination, and it's controlled by using the A and K keys. At the game's onset, the letter A will appear at the center of the screen, accompanied at the lower left by the first letter of a random, computer-generated string of letters. The object of the game is to prevent this string from lengthening.

This goal is accomplished by rapidly pressing the A key, which advances the letter at center screen, until it is the same as the computer-generated letter on the left of the string. Then press the K key to kill the identical letter, and play will continue. *Letter Cruncher* has five skill levels, so it can be extremely fast-paced or relatively easygoing.

A problem does occur in about one out of every six games. The computer-generated letters stop appearing. Novices may find this a blessing, but it can be corrected by tapping the K key.

The listing: CRUNCHER

```
5 REM              TITLE
10 CLS0:FORI=1TO 224 :READ A:PRI
NTCHR$(A+128);:NEXT
20 DATA,,,,,,,,,,,,,,,,,,,,,,,,,
,,,,,,
30 DATA,,,,47,32,32,,47,44,44,,4
4,47,44,,44,47,44,,47,44,44,,47,
44,47,,,,,
40 DATA,,,,47,32,32,,47,44,44,,3
2,47,32,,32,47,32,,47,44,44,,47,
45,34,,,,,
50 DATA,,,,44,44,44,,44,44,44,,3
2,44,32,,32,44,32,,44,44,44,,44,
32,44,,,,,
60 DATA31,28,28,,31,28,31,,31,16
,31,,31,27,16,31,,31,28,28,,31,1
6,31,,31,28,28,,31,28,31
70 DATA31,16,16,,31,29,18,,31,16
,31,,31,20,27,31,,31,16,16,,31,2
8,31,,31,28,28,,31,29,18
80 DATA28,28,28,,28,16,28,,28,28
,28,,28,16,20,28,,28,28,28,,28,1
6,28,,28,28,28,,28,16,28
```

Telewriter-64™

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

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```
90 PRINT@425, "  BILL SMITH  ";
92 PRINT@457, "COPYRIGHT 1986";
95 FOR X=1 TO 1500:NEXT X
96 FOR X=1TO2
97 PLAY"L4;V8;O4;L16.;1;L32;1;L1
6.;1;L32;1;L16.;1;L32;5;L16.;8;L
32;5;L16.;8;L32;5;L16.;8;L32;5"
98 NEXTX:PLAY"L2;1"
99 REM                END TITLE
100 P$="A":L$="":S=0
110 CLS
120 P=65
130 PRINT:INPUT "          <ENTER>
TO BEGIN";U$
135 INPUT "SKILL LEVEL(1-5)";LV
137 T=110-LV*10
140 CLS:PRINT"PLACE FINGERS OVER
 'A' AND 'K'  KEYS.  GET READY !
"
150 FOR V=1 TO 15:FOR X=1 TO 3:P
LAY"V"+STR$(V*2)+"L255;O3;2;1;2;
1":NEXT X:NEXT V
160 CLS
170 PRINT"      letter cruncher":
FOR X=1 TO 250:NEXT X
180 PRINT@207,"A"
190 H=0:D=RND(8)+64
200 B$=CHR$(D)
210 L$=L$+B$
220 PRINT@267,L$:SOUND 90,1
230 IF LEN(L$)=9 THEN 400
240 A$=INKEY$
250 IF A$="A" THEN 300
260 IF A$="K" THEN 340
270 IF A$<>"" THEN 240
280 H=H+1:IF H=T THEN 190
290 GOTO 240
300 P=P+1:IF P=73 THEN P=65
310 P$=CHR$(P)
320 PRINT@207,P$
330 GOTO 240
340 E=LEN(L$)
350 IF P$=RIGHT$(L$,1) THEN L$=L
EFT$(L$,E-1):ELSE GOTO 190
360 T=T-1
370 PRINT@267,L$:SOUND 250,1
380 S=S+1
390 GOTO240
400 FOR X=1 TO 10:PLAY "L255;O1;
V30;1;V26;2;V22;3;V18;4;V14;5;V1
2;6":SOUND 1,1:NEXT X
410 CLS:PRINT" GAME OVER"
420 PRINT:PRINT"YOU CRUSHED ";S;
" LETTERS"
425 PRINT "PLAYING SKILL LEVEL "
;LV
430 PRINT:INPUT "PLAY AGAIN ";AG
$:SOUND 180,1
440 IF LEFT$(AG$,1)<>"Y" THEN EN
D
450 GOTO 100
```

Utility

4K

Teacher's Pet

By Bill Bernico

Teachers, it's test-grading time again! Never fear; with *Grader* you'll be done with all those tests in a jiffy, with plenty of time left over to catch the reruns of *Welcome Back, Kotter.*

Upon running *Grader*, you'll be asked for the number of questions on the test. You can enter any positive number. Next, you'll have to enter the student's name.

As you review the student's test paper, press R when you find right answers and W when you find wrong ones. As you do this, the display will be updated to reflect how the student is doing — as you check *each* answer.

The display includes total number of questions, number of right answers, number of wrong answers, total answers (a reminder of which question you're on), the constantly changing percentage of right answers, and the constantly changing grade based on that percentage.

When you're finished, the student's name will appear with a message that this test has been graded. Press any key to begin with the next student. Warm up the television, you're almost done!

The listing: GRADER

```
1 'GRADER by Bill Bernico
2 NW=0:NR=0:TA=0:NQ=0:PR=0:AN=0:
CLS:INPUT"NUMBER OF QUESTIONS";N
Q:INPUT"STUDENT'S NAME";SN$:CLS
3 AN=AN+1:PRINT@0,"N0. QUESTIONS
";NQ:PRINT"NUMBER  RIGHT";NR:PRI
NT"NUMBER  WRONG";NW:TA=NR+NW:IF
TA=0THEN4ELSEPR=INT((NR/TA)*100)
4 PRINT@96,"TOTAL ANSWERS";TA:PR
INT"PERCENT RIGHT";PR;"%
5 IFPR=0THENRG$="F-":GOTO20
6 IFPR<50THENRG$="F-":GOTO20
7 IFPR<60THENRG$="F":GOTO20
8 IFPR<65THENRG$="D-":GOTO20
```

```
9 IFPR<70THENRG$="D":GOTO20
10 IFPR<74THENRG$="D+":GOTO20
11 IFPR<77THENRG$="C-":GOTO20
12 IFPR<80THENRG$="C":GOTO20
13 IFPR<83THENRG$="C+":GOTO20
14 IFPR<86THENRG$="B-":GOTO20
15 IFPR<90THENRG$="B":GOTO20
16 IFPR<93THENRG$="B+":GOTO20
17 IFPR<96THENRG$="A-":GOTO20
18 IFPR<98THENRG$="A":GOTO20
19 IFPR<101THENRG$="A+
20 PRINT@160,"RUNNING GRADE ";RG
$:IFTA=NQ THEN22ELSEPRINT@288,"W
AS ANSWER #";AN:PRINT"rIGHT OR w
RONG
21 I$=INKEY$:IFI$="R"THENNR=NR+1
:GOTO3ELSEIFI$="W"THENNW=NW+1:GO
TO3ELSE21
22 PRINT@288,SN$;"'S":PRINT"TEST
 IS NOW GRADED":FORB=1TO4:PRINT@
224,"FINAL OUTCOME":FORE=1248TO1
260:POKEE,PEEK(E)-64:NEXT:FORT=1
TO200:NEXT:PRINT@224,"FINAL OUTC
OME":FORT=1TO200:NEXT:NEXTB:PRIN
T@484,"HIT ANY KEY TO DO ANOTHER
";:EXEC44539:GOTO2
```

Contributions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

Two-Liner Contest Winner . . .

Use the right joystick to find the hidden treasure. The radar pitch will get higher as you approach your target.

The listing:

```
10 XX=128:YY=96:H=RND(256):V=RND
(191):PMODE4,1:PCLS:SCREEN1,1:FO
RJ=1TO2STEP0:X=JOYSTK(0)-31:Y=JO
YSTK(1)-31:XX=XX+(X/8):YY=YY+(Y/
8):LINE-(XX,YY),PSET:X1=XX:Y1=YY
:A=SQR((XX-H)^2+(YY-V)^2):SOUND2
55-A,1:IFA<4THEN20 ELSE NEXT
20 FOR R=2 TO 10STEP2:CIRCLE(H,V
),R:CIRCLE(H,V),22-R:NEXT:PLAY"O
3L4CDL8EL16EEL8EDL16DDL8DL2C":RU
N
```

Russ Rowgo
Kalamazoo, MI

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

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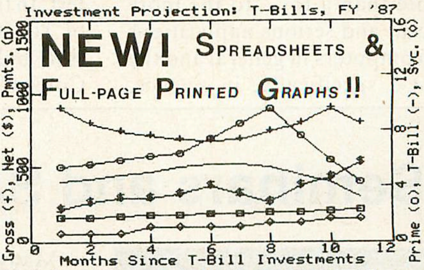

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Prospect, Kentucky

Vol.2 No.4

Reporter: Cray Augsburg
Photographer: Jim Reed

The RAINBOWfest Reporter

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Chicago RAINBOWfest 1987 Opens to Thousands

At 7 p.m., April 10, 1987, RAINBOWfest 13 opened its doors at the Hyatt Regency Woodfield in Chicago. Each person in the tremendous crowd rushed to find those long-awaited bargains. Many knew just what they were looking for and most found it. Before the evening was over and the Friday night attendees went back to their lodgings to pursue their purchases, several thousand people had crossed the threshold into our 5th Chicago show.

Saturday started with the CoCo Community breakfast. After breakfast was served, Martin Goodman, M.D., spoke on the history of the Color Computer. His speech progressed from the infant days of the CoCo, when it was "nothing more than a toy," to the more recent and serious applications of computers in general and the CoCo specifically, in science, industry and medicine.

Dr. Goodman said, "We're beginning to see the same thing happen with the CoCo 3 as did with the older CoCos. We're now seeing some good, useful software that will enable the machine to perform important tasks, thereby increasing the long life we already know exists in the CoCo. Expect to see a long life of the CoCo 3 just as you are still seeing with the earlier machines."

After Dr. Goodman's speech, Lonnie Falk, publisher of THE RAINBOW, took the opportunity to announce a new feature of RAINBOWfest. In the July 1987 issue of THE RAINBOW is a nomination ballot for THE RAINBOW Color Computer Hall of Fame. These ballots will be reviewed by a special committee and, at future RAINBOWfests, deserving members of the CoCo Community will be inducted into the Hall of Fame. Attendees were invited to make nominations at the breakfast.

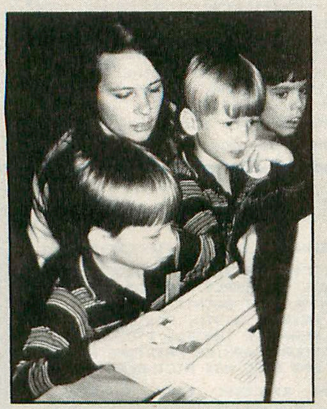
RAINBOW BOOKSHELF
Falsoft Inc
RAINBOW ON TAPE
PCM
RAIN

Over 12,000 people joined CoCo Cat for the 13th RAINBOWfest.

We thought the show was crowded Friday night, but Saturday showed us just how packed an exhibit hall can be. Bargains were everywhere. New and older software and hardware could be had at rock-bottom prices. And, if it was advice on technical matters you desired, you could be sure to get questions answered.

On Sunday, the crowd seemed wild. Perhaps it was those last minute purchases that caused the craze. Whatever it was, people were getting all they could. Many of them finally had their first "real" CoCo 3 programs and couldn't wait to get them home to try out. After the show closed that evening, it was determined that well over 12,000 people had attended this year's Chicago 'fest.

Seminars and Sandboxes Were a Hit



Walter Fisher of Indianapolis controls the action as he and his brother, Shannon, show their mom, Terry, what the Color Computer is all about.

Many people at the Chicago 1987 RAINBOWfest took the opportunity to get off their feet and, at the same time, learn a little more about the machine they love. Indeed, some people attended the show for the express purpose of the seminars.

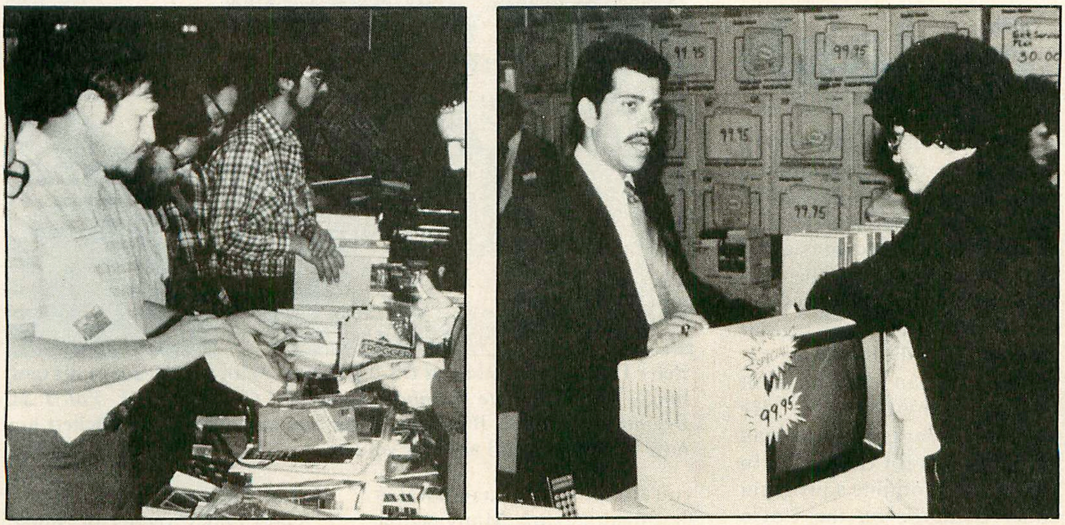
The subjects covered in the seminars ranged from "CoCo Consultations Live," given by Martin H. Goodman, M.D., to OS-9 and BASIC09 seminars given by Dale Puckett and Peter Dibble. While special care was taken to allow enough room for those interested, most of the seminars, including CoCo 3 Graphics given by Erik Gavriluk and Greg Miller, were "standing room only."

One of the most popular seminars was the Educational Sandbox. This seminar, aimed at the younger crowd, allowed children (and their parents) to get their hands on a CoCo in a learning environment.

The children were under the supervision of highly skilled employees from the local Radio Shack district. Steve Canter and Paul Brown were at the helm as youngsters were piloted through those first learning steps on a computer. CoCo Cat was there, too!

Everyone had a great time, and the Educational Sandbox was a huge success.

Radio Shack Busier Than Ever



The hot item at the Radio Shack booth was the CM-3 color composite monitor which was reduced by 66 percent, while software packages were selling for as little as $2.

One of the busiest booths at the show was Radio Shack's. Some of the deals to be found here included OS-9 Level II for $69.95, a CoCo 3 for $159, a DMP-106 for $155 and Light and Appliance controllers for $8. The biggest bargain, though, was the CM-3. This standard color composite monitor was selling for only $99, a price reduction of 66 percent! Many attendees bought these for their CoCo 2s and 3s, and some bought them just because of the low price!

If you were interested in educational software, the entire Tandy Home Educational Software series was up for grabs. Packages started the show at $4.95 on Friday night. A few were left on Sunday and were sold for as little as $2 each.

Rockin' With Speech Systems

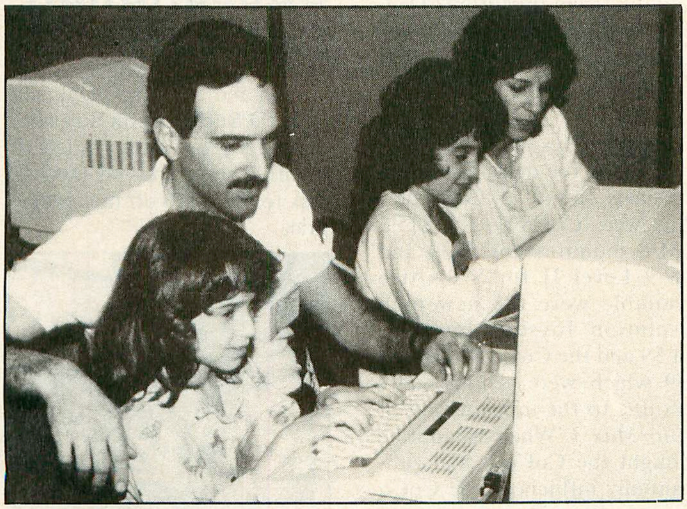
512K TURBO RAM $89.95
Speech Systems

Rich Parry of Speech Systems had quite a selection of music to show off and lots of software and hardware to show it off with. Specials at the Speech Systems booth included the 512K Turbo RAM upgrade for $89.95 and *Lyra* for only $44.95.

Diecom Products Offers Games and Fun

At Diecom's booth programs that regularly cost $28.95 were selling for $23.95 and those that regularly cost $38.95 were going at a RAINBOWfest special price of $31.95.

The hot item was *Caladuril*, a new, graphics Adventure that uses the arrow keys for movement. David Dies, President of Diecom, explained that there are several new games on the way, but we were most interested in his passing mention of a possible future game using light guns for action.



Our Educational Sandbox was a family affair for the Magnones of Dearborn Heights, Michigan. Melanie and her dad, Michael, learn together while her sister, Melissa, teams up with Rose Maurer.

CoCo Cat Makes First Appearance

CoCo Cat is alive and well! For the first time, RAINBOWfest attendees were treated to the presence of the furry feline. As people crowded around this booth and that, they were somewhat surprised to turn around and find themselves facing a six foot kitty cat.

Many onlookers cheered as CoCo Cat danced to the music emanating from the Speech Systems booth. Some observers noted that RAINBOW's Angela Kapfhammer was never around when CoCo Cat was making an appearance!

OS-9 Level II Makes a Splash

THE GREATEST
SOFTWARE DEAL
ON EARTH!

Peter Dibble, left, fields an OS-9 question. With the release of his new book, *The Complete Rainbow Guide To OS-9 Level II, Vol. I: A Beginners Guide to Windows*, Peter and co-author Dale Puckett are now working on still another volume.

Clearbrook

A welcome newcomer to the CoCo scene is Clearbrook Software Group. This Washington-based company has been marketing Information Management Systems for five years, but only recently ported their CSG-IMS relational database manager to the CoCo under OS-9. Owner Paul Kehler demonstrated CSG-IMS as well as Erina, a new full-featured OS-9 debugger Clearbrook has released.

FHL

New products seemed to be the rule at the Frank Hogg Laboratory booth. *Wiz*, a new terminal package for OS-9 Level II, was selling for $70 and FHL's book, *Inside OS-9 Level II*, was going for $35. *Dynastar*, which has been rewritten for the CoCo 3 to include windows, was selling for $100. This is $50 off the regular price. The *Dynastar* disk also includes all of the older versions of the program. FHL's *Sculptor* was selling for $200 below the regular price of $495. Frank Hogg describes it as an "environment within an environment." He said, "*Sculptor* is a not a small time program for the CoCo. In fact, we can compile a program under *Sculptor* on the CoCo and turn around and run it on a VAX!"

OS-9 Users Group

Dave Kaleita, vice president of the OS-9 Users Group, sold memberships for $25. In addition, you could pick up Users Group T-shirts for $10, or $6 if you also purchased a renewal or new membership. Many people had purchased OS-9 Level II at the show and were looking for information. They knew the Users Group was the place to go. Dave said, "We have had an excellent response. Things are looking bright now that we have fresh blood and enthusiasm for the future."

Sugar Software

Gary Davis, owner of Sugar Software, did quite well selling *OS-9 Calligrapher* and also several educational packages. According to Gary, "I haven't had a single request for software on tape. Current users must be becoming more serious in their computing since most appear to be using disk drives."

ColorMax 3 Debuts at Chicago Show

Computize

Computize was operating one of the hottest booths. Ken Klosinski of Computize said, "The pent-up demand for quality Color Computer 3 programs is certainly evident. We've sold out of *ColorMax 3* and several other packages as well!" In addition to offering the super graphics program, Computize was selling a converter designed to convert PMODE4 and *CoCo Max* pictures to the MGE format used by *ColorMax 3*.

ColorMax 3 offers 320-by-200 graphics resolution in a choice of 16 different colors and it is designed to use the Radio Shack Hi-Res Interface.

Since the product was brand new, very few printer drivers were available. You had your choice of a general Radio Shack DMP driver, an Epson-type driver or no driver at all. If you chose to purchase the package without a printer driver, Computize included a coupon that enabled you to upgrade whenever they finished the driver for your particular printer.

Erik Gavriluk and Greg Miller, co-authors of *ColorMax 3*, gave a seminar about graphics on the CoCo 3.

Derringer

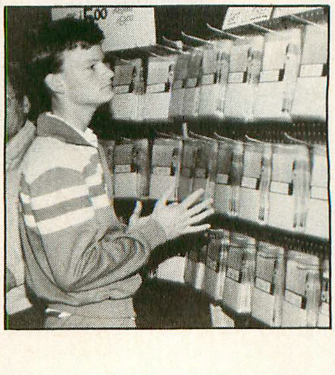
Derringer Software was selling *Dynacalc* and *Pro-Color-File* for $60 each. Their hottest seller, however, was a set of disks containing extra fonts for the new *ColorMax 3*. What can we look for in the future? Dennis Derringer claims he is working on a CoCo 3 version of *Pro-Color-File*.

Computer Plus

Some of the deals CoCo enthusiasts found at Computer Plus were CoCo 3s for $159, CM-8 monitors for $239 and OS-9 Level II for $70. Also available were the new high resolution Joystick Interface for $9 and the CoCo Mouse for $39 which were selling really fast due to the introduction of *ColorMax 3*. When asked if he thought the CoCo 3 had substantially influenced the CoCo market, Fran Purcell said, "I think so. I feel it has brought a lot more life back into the market. People were getting frustrated, but now we are seeing some new products which are changing things." To prove his point, Fran added that Computer Plus had sold all their CoCo 3s, Level II packages, Multi-Paks, Hi-Res Interfaces and CoCo Mice before 1 p.m. Saturday afternoon.

Subscription Software

Tom and Marianne Dykema of T&D Subscription Software offered a year's subscription to monthly programs on tape or disk for $60, $10 off the regular price.



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1 FOR $30 2 for $50

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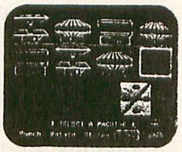
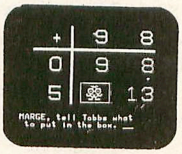
THE POND
Lead the frog across the pond in the fewest moves. 6 levels. Grade 2 - adult.

to move your frog.
Press F10 when you know the pattern.

THE FACTORY
3 level program challenges users to create geometric items on a user designed machine. Grade 4 - adult.



TEASERS BY TOBBS
Solve math puzzles on a grid. Tricky and challenging on 6 levels. Grade 2 - adult.



MARGE, tell Tobbs what to put in the box. _

3 NEW PRODUCTS FOR YOUR COCO 3 AND RGB MONITOR

NAME THAT FLAG

Identify the flag and the country it represents. Test your knowledge. Beautiful hi-res graphics.

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Fit pegs into the right place. Visual perception game. Multilevel - 6 to adult. Graphics galore! Joystick or arrow keys.

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A new version of this popular favorite that takes advantage of the special features of the Coco 3 and RGB monitor. As beautiful as it is enjoyable!

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Tape or Disk

1 for $20

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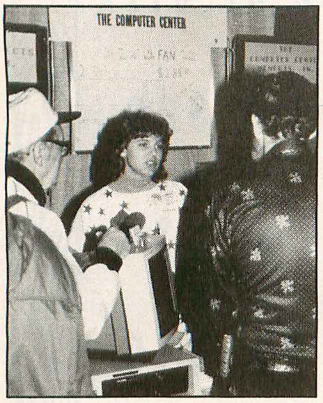
CoCo 3 Brings New Life to Market

Computer Center

The Computer Center's booth could easily have been referred to as a traveling three-ring circus. Workers had little time to even stop and catch their breath. In addition to selling dual, double-sided drive systems with controller for $289 and bare double-sided drives for $99, the Computer Center was also offering replacement keyboards, adapters, service manuals and lots of other little goodies.



Sales were great at the Computer Center booth.

Head Technician Logan Ward said, "Sales are great! A lot of people started with CoCo 2s. Then they bought the CoCo 3 and used their existing peripherals on it. Now, they are purchasing extra drives and other accessories for their older systems."

Howard Medical

Ross Litton of Howard Medical was offering several bargains on J&M and Disto controllers, which were selling for $65 and $98 respectively.

The biggest seller here was monitor drivers, however. Since Radio Shack was blowing out the CM-3, people were buying all the drivers they could get their hands on. When Ross had a moment to talk, he said, "The CoCo 3 has certainly had a positive effect on our business. A lot of advertisers were saying things were going the 'other way.' We have been able to prove them wrong with the turnout at this show."

Gimmesoft

Another newcomer of the Chicago 'fest was Gimmesoft. According to Tom DiMarco, Sr., owner of Gimmesoft, it was the introduction of the CoCo 3 that paved the way and inspired the forming of Gimmesoft. Some of the offerings at this booth were *FKEYS III* and *Custom Palette Designer* for $19.95 each and *Six Drive* for $12.95. *Six Drive* is a program that allows the use of three double-sided, double-density disk drives and makes 4 and 5 valid drive numbers.

Gimmesoft's Tom DiMarco, Sr., *left*, shows his wares to Rich Maurer as RAINBOW's Ira Barsky, *second from left*, looks on.

Glenside CoCo Club

Out host group, Glenside CoCo Club, kept busy selling RAINBOWfest T-shirts and taking care of those people who had complimentary coupons for *The Rainbow Book of Adventures.* The club's Ed Hathaway said, "This show is much bigger than last year's show. It seems that the CoCo 3 has put life back into the CoCo market."

Spectrum Projects

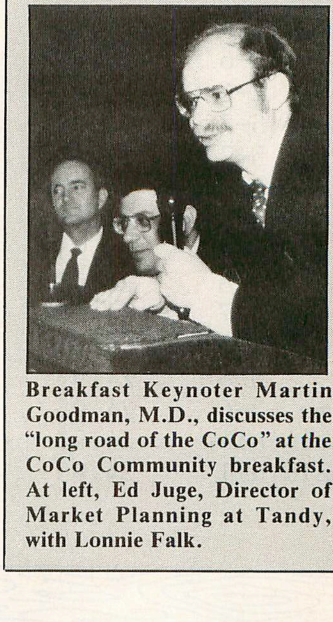
The activity at the Spectrum Projects booth was centered around products for the CoCo 3. Bob Rosen, owner of Spectrum Projects, was selling *CIII Graphics* and *CoCo 3 Secrets Revealed* as a package for $29.95 and a 512K upgrade could be had for $79.95 with purchase of *RAMDisk* software for $19.95. Soon, expect to see an 80-column version of *Telewriter* and a remote keyboard extender. Bob Rosen said, "This show is very encouraging for third-party vendors. It indicates a healthy growing market for the CoCo 3."

Can you spot the MS-DOS user in this CoCo crowd?

Communications Going Strong

Delphi

The Delphi booth was buzzing with activity as Marty Goodman (MARTYGOODMAN) and Rusty Williams (RUSTY) sold subscriptions and handbooks as well as showed people how to get around online. Marty, of course, was offering free advice to anyone who needed it. Many CoCo SIG notables stopped by the booth and spent a good deal of time talking with other members.

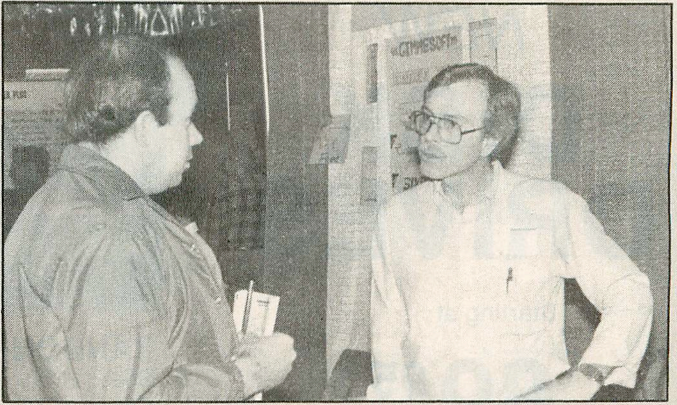


Breakfast Keynoter Martin Goodman, M.D., discusses the "long road of the CoCo" at the CoCo Community breakfast. At left, Ed Juge, Director of Market Planning at Tandy, with Lonnie Falk.

CompuServe

As in the past, Wayne Day and several others from CompuServe were onhand at the 1987 Chicago 'fest. They were offering free subscriptions, including $15 free connect time to attendees. Wayne, who seemed quite pleased with the show, said, "We've met a lot of friends; both online contacts as well as new members."

Bargains For Everyone



Carl Kreider, Software Librarian of the OS-9 Users Group, fields a question while manning the booth.

HJL

Some products never seem to lose their hold on the market and the HJL keyboard is one of them. These popular keyboards could be had at the Chicago RAINBOWfest for only $39.95. Other offerings at the HJL booth were *Quick BASIC Plus* for $12.95, the NumberJack for $49.95 and monitor adapters for $19.95. If these prices didn't attract attention, perhaps the new Soft Switch did. The Soft Switch is a software controlled switch designed to let you choose between one of two printers connected to your CoCo. It was selling for $49.95.

Public Domain Software

At Public Domain, disks were available for half-price ($5) or you could take any six disks for $25. On Sunday, Public Domain was selling the complete 27-disk library for only $75. John Robinson of Public Domain said, "Our only plans for the future are to add more disks, including CoCo 3 software, to the library and increase the user-friendly nature of our software.

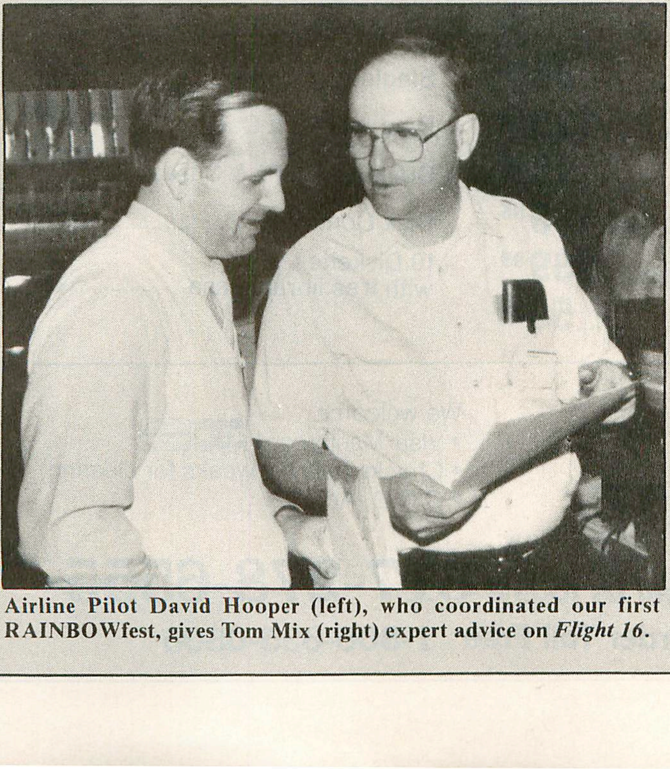
Microcom

Microcom was offering a 10 percent across-the-board price reduction on their products. On Sunday, they upped the stakes and slashed the price on all utilities by 50 percent! The hot items at this booth were 512K upgrades, *Telewriter-64* and *500 Pokes, Peeks & Execs*. Future products will include a version of *Pokes, Peeks and Execs* for the CoCo 3.

Disk Masters, Inc.

A good place to stop after purchasing those new disk drives at the 'fest was the J/D Limited (now Disk Masters, Inc.) booth. It was here that many people accessorized their systems. You could buy a pack of 25 BASF DSDD disks for $14. Or, maybe you just needed a new printer ribbon. Well, J/D had most makes. You could also pick up an Avatex 1200hc modem for $123.95.

A novelty item was the Mini Vac. This device is a miniature vacuum cleaner designed just for your computer. You can use it to clean dust from the inside or from around the keyboard. At $12.30, it really swept the RAINBOWfest attendees away.



Airline Pilot David Hooper (left), who coordinated our first RAINBOWfest, gives Tom Mix (right) expert advice on *Flight 16*.

Sardis

David C. Wiens had his hands full at the Sardis Technologies booth showing off his new dual-mode disk controller. This controller is designed to work just as a standard Radio Shack disk controller in one mode. But, change modes and the magic starts. By properly handling the interrupt line, eliminates those annoying problems with the type-ahead buffer under OS-9. No longer will users have to put up with lost characters just because the disk was being accessed! The DMC was selling at a special show price of $119.50. Regular price for the controller is $149.50.

Fazer Electronics

While it normally sells for $149, Fazer was moving out the Fazer Electronics Speak-Easy voice synthesizer at $49! Speak-Easy can receive text via the RS-232 serial port and convert it to speech. This allows a great deal of machine independence. Fazer was also selling *3D Graphics*, *Banners* and several other programs for just $2. Between sales, Ron Scarazzo had just enough time to mention that Fazer was working on a new voice recognition system that would not require any "voicetraining."

D.P. Johnson/Hemphill

Sharing a booth at this 'fest were Dan Johnson of DP Johnson and Lewis Hemphill of Hemphill Electronics. They were busy hawking their new creation, *DiskMaster*. This device combines a 20-Meg hard drive, high-density floppy drive, three serial ports, one parallel port, a hardware real-time clock and up to 1.5 Meg of RAM into one box all for $1,295. A dual floppy system without hard drive was available for $795.

The biggest seller, though, was Hemphill's new 512K upgrade for the CoCo 3. While this board cost a little more than the others on the market, its unique and well-thought-out design enabled Hemphill Electronics to sell quite a few.

SpectroSystems

Many people on CompuServe and Delphi have heard of Art Flexser. And those who don't know him from there should certainly recognize him as the author of *ADOS*. Well, Art has done it again by introducing *ADOS-3*. This CoCo 3 version not only gives the CoCo 3 owner a chance to use *ADOS*, but allows the system to boot with some of the CoCo 3 enhancements in place. "*ADOS-3* gives the CoCo 3 owner 'boot-up' access to several of the CoCo 3's new features," says Art. *ADOS-3*, which sold very well, could be bought for $30.

Tom Mix

The Tom Mix booth had all software packages at special RAINBOWfest prices of 20 percent off. We found Tom Mix demonstrating two of his newest games, *Flight 16* and *Vegas Slots*. *Flight 16* is an instrument-oriented flight simulator, while *Vegas Slots* is a CoCo 3 casino. It offers seven different slot games and all in Hi-Res with color.

NEW DISK DRIVES

Starting at

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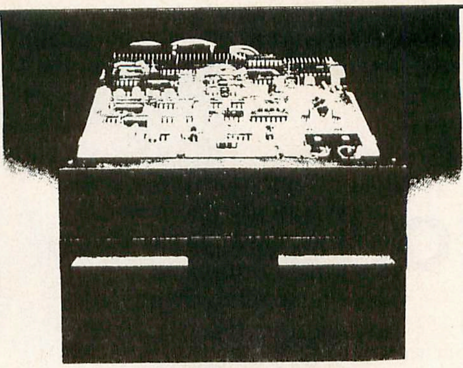
with case &
Power Supply
129.95



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Warranty *now 1 Year*

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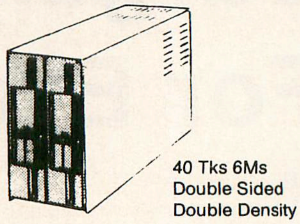

40 or 80 Tracks
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1 YEAR Warranty!

Free Software for Drive 0 Systems

CoCo Checker...Test roms, rams, disk drives and & controller printer, keyboard cassette & more.
Tape/Disk Utility...Transfers disk to tape and tape to disk.

169 95 Drive 0

- Full Ht Drive
- Single Case
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & manuals

189 95 Drive 0

- Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

289 95 Drive 0 & 1

- 2 Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

Other Drive Specials

Drives cleaned, aligned & tested, **29 95**

119 95
2nd Drive
for new Radio Shack
includes:

- Slim Line DS/DD Drive
- Cabling & Instructions
- Mounting Hardware

Full Ht Drive	**89 95**
Full Ht Drive Ps/Case	**129 95**
Slim Line Drive	**99 95**
Slim Line Drive Ps/Case	**139 95**
2 Slim Drives Ps/Case	**239 95**
Disk Controller	**59 95**

Single Ps & Case	**44 95**
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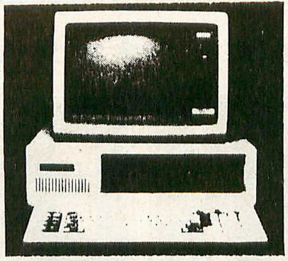

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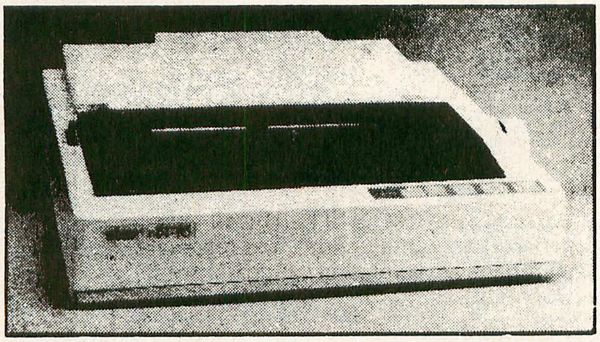

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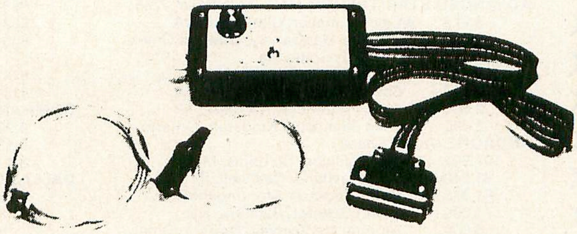

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3,960	Robbi Smith, Helena, HI
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2,450	Blain Jamieson, Kingston, Ontario

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85,240	Judy Haviland, Caldwell, ID
81,375	Corey Jackson, Monongahela, PA
71,035	Quinn Granfor, Bismark, ND
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58,200	Scott Bellman, Bettendorf, IA

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1,075	★Steve Bullard, Allen, OK
995	Jonathan Wanagel, Freeville, NY
940	Chris Norman, Liberty, PA
775	Patricio Gonzalez, Buenos Aires, Argentina
775	Quinn Granfor, Bismark, ND
720	Konnie Siewierski, Schaumburg, IL
600	Adam Broughton, Morris, PA

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120,375	★Thomas Crowe, Colombia, South America

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42,800	★Blain Jamieson, Kingston, Ontario
41,400	Becky Rumpel, Arcadia, WI

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145,800	Darren King, Yorkton, Saskatchewan
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125,000	Tony Fortino, Tacoma, WA
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100,400	Michelle Schiessl, Menasha, WI

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202,659	Brendan Powell, La Grande, OR
116,606	Darryn Bearisto, New Carlisle, Quebec
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999-0	★●Danny Wimett, Rome, NY
998-0	●Eugene Paoli, Wilmington, DE
982-0	●Geran Stalker, Rivordalo, GA
866-1	Ghislain Chillis, Trois-Rivieres, Quebec
814-0	●John Licata, Richton Park, IL
814-1	Frank D'Amato, Brooklyn, NY

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87	David & Shirley Johnson, Leicester, NC
87	Paul Summers, Orange Park, FL
89	Chris Piche, White Rock, British Columbia
89	Milan Parekh, Fullerton, CA
89	Andrew Urquhart, Metairie, LA
89	Steve Zemaitis, Howell, MI
90	Roy Grant, Toledo, OH
91	John Semonin, Akron, OH

DECATHALON *(Spectral Associates)*

10,368	★Sylvain Duguay, St. Bruno, Quebec

DEF MOV (THE RAINBOW, 1/87)

30,892	★Henry Patterson, Marshall, TX
30,051	Dave Allessi, Iselin, NJ
29,274	Daniel Streidt, Cairo, Egypt
27,346	Stephane Martel, Laval, Quebec
23,530	Patrick Martel, Laval, Quebec

DEMOLITION DERBY *(Radio Shack)*

210,700	★Duke Davis, Sandwich, IL
124,000	Judy Haviland, Caldwell, ID

DEMON ATTACK *(Imagic)*

28,780	★Daniel Streidt, Cairo, Egypt
4,960	Laundre Clemon, Sacramento, CA

DEVIL ASSAULT *(Tom Mix)*

623,550	★Dale Krueger, Maple Ridge, British Columbia
75,000	Blake Cadmus, Reading, PA
59,200	Stephane Martel, Laval, Quebec

DISCRIMINATION (THE RAINBOW, 1/87)

19	★Patrick Martel, Laval, Quebec

DOODLEBUG *(Computerware)*

10,099,110	★Andre Grenier, Valleyfield, Quebec

DOUBLE BACK *(Radio Shack)*

34,560	★Laundre Clemon, Sacramento, CA

DOWNLAND *(Radio Shack)*

99,980	★Danny Wimett, Rome, NY
98,985	Karl Gulliford, Summerville, SC
97,740	Stephane Deshaies, Beloeil, Quebec
89,490	Neil Edge, Williston, FL
77,254	Tom Audas, Fremont, CA
73,346	Jean-Francois Morin, Loretteville, Quebec
70,142	Chris Goodman, Baltimore, MD
68,142	Cooper Valentin, Vavenby, British Columbia
67,721	Keith Yampanis, Jaffrey, NH
62,442	Eddie Lawrence, Pasadena, Newfoundland
55,300	Patrico Gonzalez, Buenos Aires, Argentina
49,500	Danny Perkins, Clifton Forge, VA
43,502	Mike Ells, Charlotte, MI
40,360	Jesse Binns, Phoenix, AZ
34,424	Andrea Mayfield, Melbourne, FL
25,147	Timothy O'Neal, Commerce, TX
18,251	Sam DiCerce, Willowich, OH
16,239	Stephane Martel, Laval, Quebec
14,523	Steve Nealon, St. Louis, MO

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69	★Jason Damron, Folsom, CA

ENCHANTER *(Infocom)*

400/212	★Charly Rushing, Santa Rosa, CA
400/621	Brad Wilson, Lithia Springs, GA
400/431	Truman Bryerton, Jr., B,Ville, NY
224/358	Joseph Delaney, Augusta, GA
185/186	David Tarleton, Williamsburg, VA

ESCAPE 2012 *(Computerware)*

202	★Roy Grant, Toledo, OH

EVICTOR (THE RAINBOW, 7/86)

12,915	★Spencer Metcalf, Longview, TX
10,560	Patricio Gonzalez, Buenos Aires, Argentina

FALCON'S LAIR (THE RAINBOW, 8/85)

45,425	★Talib Khan, Bronx, NY

FIRESTORM (THE RAINBOW, 1/86)

5,680	★Kathy Rumpel, Arcadia, WI
3,760	Rick Beevers, Bloomfield, MN
3,505	Blake Cadmus, Reading, PA

GALACTIC ATTACK *(Radio Shack)*

9,930	★Daniel Streidt, Cairo, Egypt

GALAGON *(Spectral Associates)*

169,410	★Danny Dunne, Pittsfield, NH
149,520	Vernon Johnson III, Parkville, MD
116,280	Scott Jamison, Billerica, MA
107,570	Kyle Madruga, Hanford, CA
104,870	Chris Dunne, Pittsfield, NH
98,770	Etienne Duguay, St. Bruno, Quebec
73,520	Neil Edge, Williston, FL

GALAX ATTACK *(Spectral Associates)*

236,350	★Corey Leopold, Nada, TX

GALLOPING GAMBLERS (THE RAINBOW, 12/85)

3,427,660	★Sean Lair, Ewing, MO

GANTELET *(Diecom Products)*

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20,921,490	Randall Edwards, Dunlap, KS
10,020,500	Ken Hubbard, Madison, WI
7,493,340	Stirling Dell, Dundalk, Ontario
2,512,620	Jason Steele, Pensacola, FL
2,312,640	Rory Kostman, Hershey, NE
2,115,790	Jerry Honigman, Waggoner, IL
2,011,200	Jerry Colbert, Bakersfield, CA
1,108,750	Robert Fox, Dover, OH
1,094,280	Donnie Pearson, Arvada, CO
1,081,530	Michael Wallace, Bronx, NY
1,025,900	John Hotaling, Duanesburg, NY
1,016,050	Edward Swatek, Chicago, IL
933,740	Yvan Langlois, Laval, Quebec
932,660	Brian Hunter, South Berwick, ME
787,780	Brad Wilson, Lithia Springs, GA
685,840	Karen Jessen, Cleveland, OH
667,390	Robbie Smith, Helena, HI
456,220	Scott Jamison, Billerica, MA
410,868	Billy Helmick, Independence, KY
79,570	David Gordon, Pierre, SD

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523,080	★Joseph Delaney, Augusta, GA

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1,456 ★Lee Deuell, Shell Rock, IA
GOLD RUNNER *(Novasoft)*
1,088,240 ★Bob Hester, Arlington, TX
HOME ROW BOMBER (THE RAINBOW, 1/87)
6,384 ★Timothy Hennon, Highland, IN
2,420 Stephane & Patrick Martel, Laval, Quebec
JOKER POKER (THE RAINBOW, 3/87)
2,793,285 ★Blain Jamieson, Kingston, Ontario
JUNIOR'S REVENGE *(Computerware)*
257,600 ★Keith Cohen, Rocky Mount, NC
JUNKFOOD (THE RAINBOW, 11/84)
18,650 ★Daniel Streidt, Cairo, Egypt
KAMAKAZIE KAR (THE RAINBOW, 8/85)
206.45 ★Kathy Rumpel, Arcadia, WI
144.85 Chris Piche, White Rock, British Columbia
123.55 Steven Darden, Woodson Terrace, MO
83.85 Dan Dawson, Fort Wayne, IN
75.75 Tim Glenn, Havertown, PA
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6,300 ★David Darling, Longlac, Ontario
THE KING *(Tom Mix)*
3,824,280 ★Andre Grenier, Quebec, Canada
22,400 Spencer Metcalf, Longview, TX
KNOCK OUT *(Diecom Products)*
183,675 ★Rush Caley, Port Orchard, WA
181,085 Rush Caley, Port Orchard, WA
174,150 Vernon Johnson III, Parkville, MD
168,385 John Licata, Richton Park, IL
161,125 Christian Grenier, Valleyfield, Quebec
149,190 Daniel Lesage, Laval, Quebec
KORONIS RIFT *(Epyx)*
84,830 ★Thomas Beruheimer, Yoru, PA
11,430 Timothy Hennon, Highland, IN
2,785 Tony Rapson, Tulsa, OK
LANCER *(Spectral Associates)*
567,200 ★Luke Birinyi, Pefferlaw, Ontario
227,800 Andre Grenier, Valleyfield, Quebec
178,800 Christian Grenier, Valleyfield, Quebec
99,700 David Kauffman, South Haven, MI
LUNCHTIME *(Novasoft)*
42,025 ★Steve Place, Webster, NY
26,425 Joshua Conley, Springfield, OH
MICROBES *(Radio Shack)*
337,880 ★Judy Haviland, Caldwell, ID
121,330 Minesh Patel, Benton, AR
77,700 Brian Abeling, Monticello, IA
MINIGOLF (THE RAINBOW, 5/86)
21 ★Chris Lynd, Groesbeck, TX
23 Daniel Bradford, Birmingham, AL
23 Wilfrid Sloan, Newport-on-Tay, Scotland
25 Richard Donnell, Penns Grove, NJ
25 Billy Helmick, Independence, KY
32 Chris Banas, North West Territories, Canada
MISSION: F-16 ASSAULT *(Diecom Products)*
468,750 ★Karen Jessen, Cleveland, OH
355,570 Stirling Dell, Dundalk, Ontario
318,160 Jeremy Pruski, Sandwich, IL
127,550 Michael Heitz, Chicago, IL
120,670 Vernon Johnson III, Parkville, MD
49,630 Edward Swatek, Chicago, IL
45,500 Chuck Morey, Bakersfield, CA
45,375 Chris Wright, New Albany, IN
MR. DIG *(Computerware)*
357,450 ★Keith Cohen, Rocky Mount, NC
NUKE AVENGER *2(T & D Software)*
60,250 ★Doug Lute, Clymer, PA

OMNIVERSE *(Computerware)*
112 ★Roy Grant, Toledo, OH

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1,204-0 ★●Chad Johnson, Benton, AR
1,160-0 ●Mark Lang, Downieville, CA
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1,106-15 Rick Beevers, Bloomfield, NM
1,086-17 David Blankenship, Princeton, WV
1,078-2 Toby Jacobs, Bellefontaine, OH
1,064-16 Tim DeJong, Rock Valley, IA
1,028-60 Jamie Keels, Gulfport, MS
PAC DROIDS *(Programmer's Guild)*
19,710 ★Jody Ronning, Melrose, WI
PAPER ROUTE *(Diecom Products)*
1,120,350 ★Neil Haupt, Elyria, OH
1,059,350 David Kauffman, South Haven, MI
830,950 Christopher Darden, Woodson Terrace, MO
720,560 Konnie Siewierski, Schaumburg, IL
531,600 Larry Shelton, Marion, IL
160,450 Holly Forsberg, Wheaton, IL
PINBALL *(Radio Shack)*
142,400 ★Thomas Payton, Anderson, SC
PITSTOP II *(Epyx)*
51 ★Christian Grenier, Valleyfield, Quebec
9 Laundre Clemon, Sacramento, CA
POOYAN *(Datasoft)*
99,500,300 ★Danny Wimett, Rome, NY
97,500,000 Rich Fiore, Clemson, SC
54,500,000 Carlos Gameros, El Paso, TX
3,785,000 Ben Collins, Clemson, SC
1,987,000 Jon Sowle, Sanford, FL
1,546,000 Jason Maxwell, Manchester, TN
709,750 Shawn Bonning, Sayre, PA
QUIX *(Tom Mix)*
8,407,772 ★John Haldane, Tempe, AZ
1,404,000 Curtis Goodson, Sao Paulo, Brazil
1,003,104 Elisa Goodson, Sao Paulo, Brazil
205,335 John Hotaling, Duanesburg, NY
104,034 Christopher Conley, North Attleboro, MA
38,957 Patrick Martel, Laval, Quebec
19,410 Thomas Crowe, Colombia, South America
RADIO BALL *(Radio Shack)*
6,330,350 ★Myriam Ferland, Trois-Rivieres, Quebec
4,510,740 Les Dorn, Eau Claire, WI
1,945,110 Dominic Deguire, St. Basile, Quebec
1,768,940 Brian Buss, Whitehall, PA
1,631,750 David Del Purgatorio, Antioch, CA
RAIDERS (THE RAINBOW, 11/86)
2,100 ★Dave Allessi, Iselin, NJ
REACTOIDS *(Radio Shack)*
483,020 ★Henry Patterson, Marshall, TX
49,375 Daniel Streidt, Cairo, Egypt
ROGUE *(Epyx)*
17,851 ★Yvan Langlois, Laval, Quebec
4,508 Tony Rapson, Tulsa, OK
SALVAGE OF THE ASTRONAUTS (THE RAINBOW, 9/86)
1,090 ★Spencer Metcalf, Longview, TX
SANDS OF EGYPT *(Radio Shack)*
87 ★Neil Haupt, Elyria, OH
SANDWORM (THE RAINBOW, 8/86)
737 ★Becky Rumpel, Arcadia, WI
355 Matthew Smith, Denman Island, British Columbia
SHAMUS *(Radio Shack)*
120,480 ★Lynn Shrewsberry, Sunnyside, WA
47,260 Jamie Keels, Gulfport, MS
38,075 Kay Shrewsberry, Sunnyside, WA
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30,400 ★Thomas Crowe, Colombia, South America
SPEED RACER *(MichTron)*
130,720 ★Patricio Gonzalez, Buenos Aires, Argentina

SPIDERCIDE *(Radio Shack)*
6,170 ★Talib Khan, Bronx, NY
3,820 Eddie Lawrence, Pasadena, Newfoundland
3,540 James Church, Pointe Claire, Quebec
2,550 Charles Marlow, Briarwood, NY
2,000 Mike Watson, Northville, NY
1,740 Joel DeYoung, Manson, Manitoba
STARLORD (THE RAINBOW, 8/86)
10,489,710 ★Frederick Lajoie, Nova Scotia, Canada
STELLAR LIFE-LINE *(Radio Shack)*
629,000 ★Steven Smith, Matthews, NC
SUCCESS MANSION (THE RAINBOW, 1/87)
13/13 ★Dave Allessi, Iselin, NJ
SUPER ROOTER (THE RAINBOW, 5/86)
11,090 ★Frederick Lajoie, Nova Scotia, Canada
3,910 Daniel Bradford, Birmingham, AL
TEMPLE OF ROM *(Radio Shack)*
303,600 ★Tim Hennon, Highland, IN
TUT'S TUMB *(Mark Data)*
60,020 ★Don Siler, Muncie, IN
45,000 Blake Cadmus, Reading, PA
VARLOC *(Radio Shack)*
2,032 ★Tony Harbin, Cullman, AL
2,008 Philip Puffinburger, Winchester, VA
1,995 Denise Rowan, Minneapolis, MN
1,988 Randall Edwards, Dunlap, KS
1,975 Bernard Florence, Croydon, Australia
1,968 Donnie Pearson, Arvada, CO
1,952 Lynn Shrewsberry, Sunnyside, WA
1,908 Domenick Doran, Coram, NY
VICIOUS VIC (THE RAINBOW, 7/86)
18,813 ★Talib Khan, Bronx, NY
10,489 Karl Gulliford, Summerville, SC
6,294 Pat O'Neill, Nepean, Ontario
4,643 Martha James, Swarthmore, PA
3,285 Richard Donnell, Penns Grove, NJ
THE VORTEX FACTOR *(Mark Data)*
100/276 ★Tommy Crouser, Dunbar, WV
100/483 Rick & Brenda Stump, Laureldale, PA
210 Paul Maxwell, Vancouver, British Columbia
WARP FACTOR X *(Prickly-Pear)*
5,829,559 ★Doug Lute, Clymer, PA
WILDWEST *(Tom Mix)*
38 ★Neil Haupt, Elyria, OH
WRESTLE MANIAC *(Diecom)*
546,315 ★Louis Bouchard, Gatineau, Quebec
39,086 Billy Helmick, Independence, KY
5,000 Christian Grenier, Quebec, Canada
ZAXXON *(Datasoft)*
2,061,000 ★Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA
1,300,500 Dan Brown, Pittsford, NY
1,100,600 Andrew Urquhart, Metairie, LA
253,400 Bob Dewitt, Blue Island, IL
163,700 Daniel Bradford, Birmingham, AL
119,600 Daniel Streidt, Cairo, Egypt
111,400 Jeff Miller, Bronson, MI
83,700 David Darling, Longlac, Ontario
72,800 Tom Maccarone, Swampscott, MA
67,400 Carlos Gameros, El Paso, TX
59,800 Garrett Stangel, Milwaukee, WI
11,400 Mike Ells, Charlotte, MI
ZONX (THE RAINBOW, 10/85)
6,500 ★Daniel Streidt, Cairo, Egypt

— Jody Doyle

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, which appears bimonthly, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

In response to letters from:

- Derek Myall: In *Knock Out*, the first thing to remember about the Knock Out Kid is that no matter how hard you try, the Knock Out Kid is much faster than you, so don't use the Knock Out punch. Once you start punching, don't stop. When he walks into the ring, literally get your fists up.

Konnie Siewierski
Schaumburg, IL

- Travis Stramer: In *Raaku-Tu*, try lighting the candle in the petite chamber, enter the room and attack the gargoyle with the candle.

Roger Rance
Charleston, SC

- Chuck Poynter: In *Hitchhiker's Guide to the Galaxy*, after Ford shows up, don't take the towel from him, just keep waiting. He will then talk with Prosser and lay down for you.

Brendan Powell
LaGrande, OR

- David Harris and Bill Marks: To get the second key for the apartment with the Rio sign on it in the *Interbank Incident*, go to the casino in Rio and bribe Rolf, the doorman, and he will usually give you a token. Go inside the casino and put the token in the slot machine closest to you. You will receive the skeleton key that opens the locker on the yacht and the door on the apartment in Seattle.

I can't get inside the apartment. I used both keys to unlock the two locks on the door but nothing happens.

Del Scharff
Spring Lake Park, MN

- George Lane: In *Sands of Egypt*, the canteen is obtained by going east three times after you kill the snake. To get back to the pool, feed and mount the camel. Ride the camel and dismount. Use the palm fronds to make a rope. To do this, type `MAKE ROPE` and `BRAID FRONDS`.

Eddie Baker
Lincoln Park, NJ

- Amber Murray: To incant the Vulcan ring in *Dungeons of Daggorath*, type `INCANT FIRE`. The torches will reveal themselves after you kill both blobs.

- Richard Little: To kill the blobs in *Dungeons of Daggorath*, try attacking twice, move back, attack, move back, etc., until they're dead. Try the same process on the warrior on Level 2. There are no scrolls or flasks on Level 1.

- Daniel Bradford: In *Zaxxon*, to refuel you must destroy the cylinders. You may want to memorize positions on the screen where you are safe at certain times.

Jeff Coburn
Easton, PA

Scoreboard:

In *Dungeons of Daggorath*, I always get a ring. When I reveal it, it's a Vulcan ring. What is the correct incantation? What creature has a flask? What creature holds an "iron" sword?

On the third level, an invisible creature kills me. How do I see it? What is the creature?

Ron Smith
Oak Ridge, NJ

Scoreboard:

How do you destroy the evil knights in *Dungeons of Daggorath*? I would also like to know about the scorpions, wraiths and the goldrogs, and how to defeat them.

Shawn Bonning
Sayre, PA

Scoreboard:

In *Sea Search*, how do you get the speargun, and what is the balloon used for? How do you unstick the anchor from the sand, and how do you check the air gauge on the tanks?

I also need help with the following games from Owl's Nest Software: *Bashan, Four Mile, ESP Island and Atlantis*. I am able to move from place to place, but I am unable to get anything accomplished.

Nila Grose
Manheim, PA

Scoreboard:

How do I get to the bean plant in *Pyramid*? I know that once I find it, I'm supposed to water it twice so it will reach the hole. How do I get past the snake?

After the mummy has stolen all your treasures, enter the maze to get them back.

Ian Harrell
Mt. Airy, NC

Scoreboard:

I have examined every inch of every room in *Pyramid* and can't find the final treasure.

M.K. Watts
San Diego, CA

Scoreboard:

I have *Pyramid 2000* and have gotten up to 180 points, but then I am stuck. What are the magazines for and what does `PLUGH` mean and where do I use it?

The bird statue has a great effect on the serpent, and the word "strong" doesn't mean physical strength.

Clint Wessels
Willow River, British Columbia

Scoreboard:

In *Dallas Quest*, once you get to the Chugalug Trading Post and you give the monkey the tobacco and he takes the cover off the trap door, how do you go down the ladder?

In *Sands of Egypt*, where is the scepter for the drain cover in the swimming pool?

Mike Duvall
Zanesville, OH

Scoreboard:

In *Wrestle Maniac*, go into the top-left corner of the ring and move directly down. Wait for your opponent to come in front of you and move your joystick to the left and hold it there until the opponent is thrown into the ropes.

Ryan Clark
Pascagoula, MS

Scoreboard:

In *Sands of Egypt*, I am in the underground canal and I have the ladder, but I can't figure out how to get out. Does it have something to do with the hole in the ceiling? If so, how do I get up?

Jason Mielke
Oakfield, WI

Scoreboard:

In *Sands of Egypt*, all I have found are the magnifier, shovel, torch, rope, canteen and the snake. How do I get further in the game?

Allen Bell
Atoka, OK

Scoreboard:

In *Zork I*, how do you unlock the grating and what do you do with the chain on the basket? In *Cutthroats*, how do you get into the lighthouse, the barren field and the back doors?

Louie Elliott
Cowan, TN

Scoreboard:

In *Vortex Factor*, how do I get to Cairo? I have read that you should go to London 1200, but I can't get there.

Also, in *Hitchhiker's Guide to the Galaxy*, I am left alone on the Heart of Gold. Nothing I have tried has impressed the door to open for me.

Brit Rothrock
Roanoke, VA

Scoreboard:

In *Raaku-Tu*, I can find my way to the room with the gargoyle, but I can't find the candle or the lamp. How do you get across the rug to the east door?

Tim Collett
Polk, NE

Scoreboard:

I have the food, sword, lamp, candle, lever, chopstick, ring and idol after putting the coin in the slot in *Raaku-Tu*, but what's next?

Michael Sargent
Pine Bluff, AR

Scoreboard:

How do you build a chip for the sound-locked room on Level 5 in *Robot Odyssey*?

Melvin Grow
Alameda, CA

Scoreboard:

To steal the Heart of Gold in *Hitchhiker's Guide to the Galaxy*, you must shoot the rifles. To get Prosser to lie down in front of the bulldozer, you simply tell him to. First, concentrate on time traveling and collecting all objects you come upon. After this, you can get real tea.

To get the plotter, you must type `TYPE"`. To avoid being killed by a flying brick, you must get away from the house.

In *Mythology*, what idea does Icarus need? In *CoCoZone*, how do you get the oxygen?

Mike Morrell
Lilburn, GA

Scoreboard:

How do I get my lifeboat to stop sinking in *Blackbeard's Island*?

Doug Berry
Huntington, WV

Scoreboard:

How do I pass the shark in *Sea Quest*?

Ian Renauld
St. Eustache, Quebec

Scoreboard:

I went to the field and killed the first spider in *Trekboer*, then at the grate there's another spider. How can I manage to kill the second spider? In *Sea Quest*, I found the golden anchor, a ring, a pearl and the silver bars, but I can't find the treasure.

How do I squeeze the lime in *Vortex Factor* over the battery? In *Black Sanctum*, I cannot find a container when I want to bring snow with me.

Daniel Streidt
Cairo, Egypt

Scoreboard:

In *The Magic of Zanth*, I can't find a way past the lake. No matter which way I go, the dragon eats me. How do I find out what the "something" is that is on the bottom of the lake?

Randy Pischke
West Germany

Scoreboard:

In *Magic of Zanth*, I am stuck at the lake. If I try swimming it, I get "and you swim for awhile" over and over. There is something beneath the water, but I can't find out what it is. Also, I have been unable to open the bottle.

Joan Michel
Kennewick, WA

Scoreboard:

In *Castle Thuudo*, what do you do at the door? In *Enchanter*, how do you get past the hammers after you have passed them once?

In *Treasure of the Aztecs*, what do you do at the brick wall and at the hut? In *Color Car*, how do you get past the third stage?

How do you get past the wraith in *Martian Crypt*?

Neil Lehouillier
Debden, Saskatchewan

Scoreboard:

Where is the rope I need to get down the cliff in *Shenanigans*?

Greg Barnes
Columbia Station, OH

Scoreboard:

How do you find the "Right Direction" in *Omniverse*?

Audrey De Lisle
San Francisco, CA

Scoreboard:

How do you pass the sheer wall in *Martian Crypt*? How do you pass the alcove in *Black Sanctum*?

Ian Renauld
St. Eustache, Quebec

Scoreboard:

In *Dragon's Blade*, rest in a restive place and shoot things you can't reach. The witch enjoys powerful things and you should dig in a grave situation. Saplings make great poles and wearing helmets are considered to be good luck.

In the temple, say what is on the scroll. Throwing boulders may save your life and search treasure carefully. Logs can float and can also be guided. The holy symbol will get you past the stone door, if you use it a certain way. Get the Dragon Blade, and win the game.

Jason Damron
Folsom, CA

Scoreboard:

In *CoCo Zone*, how do you get past the spider web? In *Dallas Quest*, where do you find the lamp?

In *Success Mansion*, where do you find Scroll 4, Scroll 6, Scroll 10 and Scroll 12?

Hatton Humphrey
Bonham, TX

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

— Jody Doyle

32K ECB

Getting Geared Up for Safer Driving

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

It's already "back to school" time, and, as usual, our trusty CoCo can look forward to another season of educational applications for those of you fortunate enough to have a CoCo as a resource. In the past few years, we have covered a multitude of educational topics including math, grammar, science, life skills and on and on. What educational areas haven't we touched upon? Is there a field?

Sure enough, a suggestion finally came my way for a significant educational field that I haven't seen any programs on: driver's education. Therefore, after many letters suggesting as many practical educational programs as I could come up with, I put together *Road Skills* for this month's "Wishing Well." It is a full-fledged driver's education instructional program that will work on Color Computers 1, 2 and 3. (Sorry, no MC-10 on this one; too many pokes.)

Why Driver's Ed?

With all of the concern about drunk driving and the many fatalities caused by it each year, driver's education has become more important with each passing year. Add to that the movement toward our becoming an increasingly mobile society, as well as peer pressure for young people to have their own wheels, and you will soon realize that good road knowledge is actually an essential survival skill.

When you think about it, computers are ideal tools for reinforcing knowledge of driving regulations and good driving skills. After all, don't pilots train in simulators that graphically teach them the skills needed to fly? More people drive than fly, so sharp driving skills can benefit a larger segment of the population — those exposed to the dangers of reckless driving.

Road Skills is not supposed to be a graphic, driver-training simulator. After all, most "Wishing Well" programs are written in less than a month's time. A graphics driving program is a possibility, but that will take a little more time. (*Road Skills II* may become a reality sometime in the next year if time permits.)

Instead, *Road Skills* is designed to review some major road regulations that are common to all 50 states, as well as some graphics illustrations of right-of-way situations. (Since automobile and driver licensing is a function of state governments, there are some variations in requirements and regulations from state to state. Therefore, I have tried to center on the areas that are the same from state to state.)

Every state requires some type of pretest before awarding a learner's permit and road training. Most often, this test is in written form, so it only makes sense to review knowledge of the written road regulations before any type of simulation is even attempted.

The Program

Road Skills is somewhat like some of the older quiz programs that have appeared in past articles of the "Wishing Well." However, this program is constructed differently in two ways.

First, a graphics Simulation is included at the end of the review section; it shows a bird's-eye view of a four-way intersection with two cars approaching. The right of way is illustrated in each example in a way that will help you visualize who may or may not proceed.

Secondly, the written section, unlike previous quiz programs, can actually merge the correct response to the corresponding statement and allow you to review all the material in sentence form before even taking the quiz. This is especially useful since it makes the program instructional in nature, rather than diagnostic. (Some of you may recall that this is my big gripe with commercial educational software.)

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Therefore, we have a totally new program that you can add to if there are additional driver's skills you would like to see reviewed, which are applicable to the state you live in. (This information was taken from the Massachusetts Driver's Learner's Permit booklet. I have included 30 statements, but there is room for up to 50 so you can add your own. In Massachusetts, you must correctly answer seven of 10 multiple-choice questions when you take the test at the Registry of Motor Vehicles.)

Another change is that I have put this entire program into an inverse video screen using pokes. Each printed statement is made equal to JK$ and then sent to the video subroutine starting in Line 375. The string is broken down using the MID$ command, and the ASCII value of each character is poked inversely to the screen. This gives you a very attractive screen to read from. However, it also means that you must be very precise in how you type in the program, since a misplaced poke value could lock up your machine.

This technique also adds a nice, gradual, letter-by-letter scroll to the printing and wiping of text. I could have added speech to this program, but I decided against it for two reasons. First, the people using this program are likely to be teenagers, so artificial speech would most certainly seem too much like a gimmick. Second, it would require restructuring most of the text so the Speech Pak could correctly pronounce most of it. This would make the program quite a bit longer.

Besides, so many of my recent programs have been talking programs that I was a little afraid to do another one and possibly scare away those of you who don't have a Speech Pak. (Those other programs worked well without the Speech Pak, but if you didn't read the article or type in the program, the heading at the top of the page may have scared you away.)

Using the Program

On running *Road Skills*, a "Wishing Well" style title screen will appear. You have a choice of pressing R for review or Q for quiz. Pressing R will let you read each of the 30 statements in the DATA file. After reading each statement, press ENTER to go on to the next one.

At the end of the 30 statements, the graphics section will begin. Press ENTER at the end of each screen to proceed to the next. You will notice that the cars, marked A and B, will actually drive across the streets to accurately display who is going in which direction. It took a few subroutines, but I think you will find it to be a nice effect.

After you finish with the review, the program will return to the start. I chose this method rather than going directly into the quiz in case anyone wanted to review the material more than once before trying the quiz. This is much better than having to press BREAK and rerun the program.

When you select Q for quiz, the computer will drill you on the 30 statements (or more if you have added some) that you find in the review section. Each statement will now have a blank and two possible choices, A or B. The order of the material and order of the responses are totally at random. If you answer correctly, the screen will say so. If you answer incorrectly, the computer will display the correct response when you press ENTER.

You may proceed to each statement by pressing ENTER. Pressing the @ key will give you the score card. Once you are on the score card, you may rerun the program by pressing Y (yes), end by pressing N (no), or continue where you left off by pressing C (continue). If you get a passing grade, the screen will congratulate you.

Adding Your Own Data

You may enter your own data at the end of the program before Line 5000 by including three pieces of data:

1) The beginning of a sentence
2) The correct conclusion
3) An incorrect conclusion

Be sure to separate each piece of data by a comma and to use quotation marks if your sentence has any commas in it. Here is an example:

```
2000 DATA "TO START THE CAR,
INSERT THE","IGNITION KEY",
"TRUNK KEY"
```

The program will insert the spaces and periods. Just be sure to leave Line 5000 just as it is.

If you make a mistake in any DATA line, you will get an OD Error. Please do not write and tell me that you cannot find your DATA errors. Check each DATA line carefully and the program *will* work!

Conclusion

While *Road Skills* will not ensure that your youngster will become a safe driver, it can help prepare him or her in knowing the essential knowledge that leads to safe driving. Let me know if you find it useful and whether I should work on *Road Skills II*.

Until next month, good luck in the coming school year. ☐

90	74	580	21
180	212	1040	173
265	57	1110	219
310	116	1160	163
375	77	1230	19
480	233	END	200

The listing: ROADSKIL

```
10 REM**************************
15 REM* ROAD SKILLS INSTRUCTOR *
20 REM*    BY FRED B.SCERBO    *
25 REM*      60 HARDING AVE    *
30 REM*  NORTH ADAMS,MA 01247  *
35 REM*   COPYRIGHT (C) 1987   *
40 REM**************************
45 CLEAR2000:R$=CHR$(128)
50 DIM AO(50),A$(50),B$(50),C$(5
0),NP(50),C(8)
55 CLS0:FORI=1TO32:PRINTCHR$(172
);:NEXT
60 FORI=1TO192:READA:PRINTCHR$(A
+128);:NEXT
65 DATA126,124,122,126,124,122,1
26,124,122,125,124,125,,,30,28,2
6,29,,,30,20,30,20,30,16,20,30,,
21,28,29
70 DATA122,,122,122,,122,122,96,
122,117,,117,,,26,,24,21,16,22,1
6,,26,,26,,16,26,,21,,20
```

```
75 DATA123,115,122,122,,122,123,
115,122,117,96,117,,,27,19,18,21
,22,16,,,26,,26,,16,26,,21,19,19
80 DATA122,117,,122,,122,122,112
,122,117,112,117,,,,,26,21,20,18
,,,26,,26,,16,26,,,,21
85 DATA122,117,96,122,,122,122,,
122,117,,117,,16,26,,26,21,,20,1
8,,26,,26,21,16,26,21,21,,21
90 DATA122,117,114,123,115,122,1
22,112,122,119,115,119,,,27,19,2
6,23,18,,27,17,27,17,27,23,17,27
,23,21,19,23
95 FORI=1TO32:PRINTCHR$(163);:NE
XT
100 PRINT@325," INSTRUCTIONAL QU
IZ  ";
105 PRINT@357,"    BY FRED B.SCER
BO   ";
110 PRINT@389,"  COPYRIGHT (C) 1
987  ";
115 PRINT@453,"  (R)EVIEW OR (Q)
UIZ  ";
120 SW=30:KZ=RND(-TIMER)
125 FORJ=1TO50
130 READA$(J),B$(J),C$(J):IF A$(
J)="END"THEN140
135 NEXTJ
140 J=J-1
145 FORI=143TO255STEP16:KK=KK+1:
C(KK)=I:NEXT
150 FORI=1TOJ
155 AO(I)=RND(J)
160 IF NP(AO(I))=1 THEN155
165 NP(AO(I))=1:NEXTI
170 X$=INKEY$:IFX$="R"THEN185
175 IFX$="Q"THEN355
180 GOTO170
185 CLS0:FORI=1024TO1535:POKEI,3
2:NEXT:FORP=1TOJ:WW=RND(8)
190 FORI=1024TO1055:POKEI,C(WW):
POKEI+480,C(WW):NEXT
195 VL=96:JK$=A$(P)+" "+B$(P)+".
":GOSUB375
200 GOSUB205:GOTO215
205 X$=INKEY$:IFX$<>CHR$(13)THEN
205
210 RETURN
215 FORI=1088TO1120+VL:POKEI,32:
NEXTI
220 NEXTP
225 CLS7:GOSUB230:GOTO235
230 FORI=1440TO1535:POKEI,32:NEX
T:RETURN
235 FORY=0TO31:FORI=26TO37:RESET
(I,Y):NEXTI,Y:PRINT@128,"";:FORI
=1TO128:PRINTR$;:NEXTI
240 VL=384:JK$="NOW WE WILL LOOK
 AT SOME EXAMPLES OF THE RIGHT O
F WAY  LAW.":GOSUB375
245 X$=INKEY$:IFX$<>CHR$(13)THEN
245
250 GOSUB230:GOSUB255:GOSUB260:G
OTO265
255 FORI=191TO180STEP-1:PRINT@I,
"A";:FORY=1TO20:NEXTY:PRINT@I,R$
;:NEXTI:PRINT@I,"A";:RETURN
260 FORI=401TO305STEP-32:PRINT@I
,"B";:FORY=1TO20:NEXTY:PRINT@I,R
$;:NEXTI:PRINT@I,"B";:RETURN
265 VL=384:JK$="AT THIS INTERSEC
TION, CAR A HAS THE RIGHT OF WAY
 OVER CAR B SINCE A IS ON B'S RI
GHT.":GOSUB375
270 GOSUB205:GOSUB275:GOSUB280:G
OTO285
275 FORI=179TO160STEP-1:PRINT@I,
"A";:FORY=1TO20:NEXTY:PRINT@I,R$
;:NEXTI:RETURN
280 FORI=273TO17STEP-32:PRINT@I,
"B";:FORY=1TO20:NEXTY:PRINT@I,R$
;:NEXTI:RETURN
285 GOSUB230:GOSUB290:GOSUB260:G
OTO295
290 FORI=192TO203:PRINT@I,"A";:F
ORY=1TO20:NEXTY:PRINT@I,R$;:NEXT
I:PRINT@I,"A";:RETURN
295 VL=384:JK$="IN THIS CASE, CA
R B HAS THE RIGHT OF WAY SINCE I
T IS ENTERING ON CAR A'S RIGHT":
GOSUB375
300 GOSUB205:GOSUB280:GOSUB305:G
OSUB230:GOSUB310:GOSUB290:GOTO31
5
305 FORI=204TO223:PRINT@I,"A";:F
ORY=1TO20:NEXTY:PRINT@I,R$;:NEXT
I:RETURN
310 FORI=14TO78STEP32:PRINT@I,"B
";:FORY=1TO20:NEXTY:PRINT@I,R$;:
NEXTI:PRINT@I,"B";:RETURN
315 GOSUB230:VL=384:JK$="THIS TI
ME, CAR A HAS THE RIGHT OF WAY S
INCE IT IS ON CAR B'S RIGHT.":GO
SUB375
320 GOSUB205:GOSUB305:GOSUB325:G
OTO330
325 FORI=110TO396STEP32:PRINT@I,
"B";:FORY=1TO20:NEXTY:PRINT@I,R$
;:NEXTI:RETURN
330 GOSUB230:GOSUB310:GOSUB255:V
L=384:JK$="THIS TIME, CAR B HAS
THE RIGHT OF WAY SINCE IT IS ON
CAR A'S RIGHT.":GOSUB375
335 GOSUB205:GOSUB325:GOSUB275
340 GOSUB230:FORY=0TO7:FORI=26TO
37:SET(I,Y,7):NEXTI,Y:PRINT@179,
CHR$(128);:PRINT@273,"A";:VL=384
:JK$="AT A T-SHAPED INTERSECTION
, CAR A MUST COME TO A COMPLETE
STOP BEFORE TURNING.":GOSUB375
345 GOSUB205
350 RUN
355 CLS0:FORP=1TOJ
360 FORI=1056TO1503:POKEI,32:NEX
T:WW=RND(8):FORI=1024TO1055:POKE
I,C(WW):POKEI+480,C(WW):NEXT
365 VL=32
370 JK$=A$(AO(P))+" .......":GOS
UB375:GOTO410
375 IFLEN(JK$)<=SW THEN 400
380 FOR T=SW TO0STEP-1:IFMID$(JK
$,T,1)=" "THEN390
385 NEXT T:GOTO400
390 L$=LEFT$(JK$,T):L$="   "+L$:G
OSUB600:JK$=RIGHT$(JK$,(LEN(JK$)
)-T):GOTO375
395 GOTO395
400 L$=" "+JK$:GOSUB600
405 RETURN
410 VL=VL+64
415 D=RND(20):IFD=>11THEN425
420 F$=B$(AO(P)):H$=C$(AO(P)):J$
="A":M$="B":GOTO430
425 F$=C$(AO(P)):H$=B$(AO(P)):J$
="B":M$="A":GOTO430
430 JK$="A) "+F$:GOSUB375:VL=VL+
32
435 JK$="B) "+H$:GOSUB375:VL=VL+
32
440 G$=INKEY$:IF G$=""THEN440
445 IF G$=J$THEN465
450 IF G$=M$THEN465
455 IF G$="@"THEN525
460 GOTO440
465 IF G$=J$THEN480
470 GOTO490
475 IF C(F(G))<>AO(P) THEN490
480 L$="  YOU ARE CORRECT!":GOSU
B600
485 CR=CR+1:GOTO515
490 L$="  NO! THAT IS INCORRECT!
":GOSUB600
495 IR=IR+1
500 IFINKEY$<>CHR$(13)THEN500
505 FORI=1088TO1502:POKEI,32:NEX
TI
510 VL=32:JK$="THIS IS WHAT THE
CORRECT RESPONSE SHOULD BE.":GOS
UB375:VL=VL+32:JK$=A$(AO(P))+" "
+B$(AO(P))+".":GOSUB375
515 IFINKEY$<>CHR$(13)THEN515
520 NEXTP
525 CLS:PRINT:PRINT:PRINT
530 PRINT"    NUMBER CORRECT = "
CR
535 PRINT
540 PRINT"    NUMBER WRONG    = "
IR
545 J=CR+IR:IFJ=0THENJ=1
550 PRINT:PRINT"    STUDENT SCOR
E = ";INT(CR*100/J);"%"
555 PRINT:PRINT"    ANOTHER TRY
(Y/N/C)"
560 IF INT(CR*100/J)=>70THEN570
565 PRINT:PRINT"    YOU NEED TO
STUDY MORE!!!":GOTO575
570 PRINT:PRINT"    NOT BAD AT A
LL !!!"
575 W$=INKEY$:IF W$=""THEN575
580 IF W$="Y" THEN RUN
585 IF W$="C"THENCLS0:GOTO520
590 IF W$="N" THEN CLS:END
595 GOTO575
600 HL=0:VL=VL+32:DR=LEN(L$):FOR
K=1TO DR:ZV=ASC(MID$(L$,K,1)):IF
ZV<=64THENZV=ZV+64
605 POKE1024+VL+HL,ZV-64:HL=HL+1
:NEXTK:RETURN
1000 DATA "IN MANY STATES, DURIN
G THE ROAD TEST, THE OPERATOR MU
ST",USE HAND SIGNALS FOR TURNS,U
SE THE DIRECTIONAL LIGHTS
1010 DATA "AN INTERSECTING WAY I
S WHERE",ANY ROADS JOIN AT AN AN
GLE,ROADS BRANCH OFF
1020 DATA "THE RIGHT OF WAY LAW
STATES THAT WHEN CARS ARE AT A F
OUR WAY STOP AT THE SAME TIME, T
HE RIGHT OF WAY BELONGS TO",THE
CAR ON THE RIGHT,THE CAR TURNING
1030 DATA "WHEN AN OPERATOR APPR
OACHES A PEDESTRIAN WHO IS IN TH
E STREET, THE DRIVER MUST",COME
TO A STOP,SOUND HIS HORN
1040 DATA "WHEN AN OPERATOR APPR
OACHES AN INTERSECTION WITH A YI
ELD SIGN, THE DRIVER MUST",STOP
UNTIL SAFE TO PROCEED,PROCEED SL
OWLY
1050 DATA "WHEN AN OPERATOR APPR
OACHES A HORSE OR ANIMAL BEING D
RIVEN, THE OPERATOR MUST",STOP I
F THE ANIMAL IS FRIGHTENED,SOUND
 HIS HORN
1060 DATA "WHEN YOU ARE APPROACH
ED BY A FIRE VEHICLE, YOU MUST P
ULL TO THE",RIGHT UNTIL IT PASSE
S,LEFT UNTIL IT PASSES
1070 DATA "WHEN YOU ARE BEING PA
SSED BY ANOTHER VEHICLE, YOU MU
ST STAY TO THE",RIGHT AND NOT BL
OCK THE PASSER,CENTER AND LET TH
EM GO RIGHT
1080 DATA "WHEN APPROACHING A BL
```

```
IND PERSON, AN OPERATOR MUST",ST
OP FOR THE PERSON CROSSING,SOUND
 THE HORN AND SLOW DOWN
1090 DATA "WHEN PASSING A VEHICL
E GOING IN THE SAME DIRECTION, Y
OU MUST STAY TO",THE LEFT AND PA
SS WITH SAFE CLEARANCE,WHICHEVER
 SIDE HAS THE BEST CLEARANCE
1100 DATA "THE AMOUNT OF CLEAR A
ND UNOBSTRUCTED VIEW YOU MUST HA
VE BEFORE OVERTAKING A VEHICLE B
EING PASSED IS",FOUR HUNDRED FEE
T,TWO HUNDRED FEET
1110 DATA "WHEN APPROACHING OR P
ASSING A SCHOOL BUS WHICH HAS ST
OPPED TO ALLOW PASSENGERS ON OR
OFF, YOU MUST",STOP UNTIL THE BL
INKING LIGHTS ARE OFF,SOUND YOUR
 HORN AND SLOWLY PASS
1120 DATA "WHEN MAKING A LEFT HA
ND TURN ON A ONE WAY STREET, THE
 OPERATOR MUST SIGNAL, POSITION
THE CAR IN THE LANE NEAREST THE"
,LEFT HAND CURB AND TURN,RIGHT H
AND LANE AND TURN
1130 DATA "WHEN APPROACHING A CU
RVE OR CORNER WITH AN OBSTRUCTED
 VIEW, YOU MUST","SLOW DOWN AND
KEEP TO THE RIGHT",SLOW DOWN AND
 SOUND THE HORN
1140 DATA "THE FUNDAMENTAL SPEED
 LAW IS THE REASONABLE SPEED FOR
","TRAFFIC, ROADWAY USE AND SAFE
TY","THE CONDITION AND AGE OF TH
E CAR"
1150 DATA "THE PRINCIPLE CAUSE O
F AUTOMOBILE ACCIDENTS, BOTH FAT
AL AND OTHERWISE IS",SPEED TOO F
AST FOR CONDITIONS,DRIVING TOO F
AR BELOW THE POSTED RATE
1160 DATA "AN OPERATOR IS REQURE
D TO DRIVE AT SPEEDS BELOW POSTE
D SPEEDS WHEN ROAD CONDITIONS AR
E",NOT IDEAL DUE TO WEATHER OR T
RAFFIC,MADE WORSE BY OLDER DRIVE
RS
1170 DATA "OUTSIDE A THICKLY SET
TLED DISTRICT, AN UNREASONABLE S
PEED IS ANYTHING ABOVE",40 MPH,3
0 MPH
1180 DATA "IN A THICKLY SETTLED
DISTRICT, AN UNREASONABLE SPEED
IS ANY SPEED ABOVE",30 MPH,40 MP
H
1190 DATA "THE OPERATOR OF A VEH
ICLE EMRGING FROM A DRIVEWAY, OR
 A GARAGE MUST",STOP AND YIELD T
O TRAFFIC,HONK AND PROCEED WITH
CAUTION
1200 DATA "BEFORE MOVING AWAY FR
OM THE CURB OR PARKING POSITION,
 THE OPERATOR MUST YIELD TO TRAF
FIC AND",SIGNAL HIS INTENT TO EN
TER TRAFFIC,SIGNAL IF IT IS AT N
IGHT
1210 DATA "WHEN A RED LIGHT SHOW
S ALONE ON A TRAFFIC SIGNAL,THE
OPERATOR MUST",STOP,SLOW DOWN AN
D BE PREPARED TO STOP
1220 DATA "A FLASHING RED LIGHT
MEANS THE OPERATOR MUST",STOP AN
D PROCEED WHEN SAFE TO DO SO,PRO
CEED WHILE SOUNDING HORN
1230 DATA "WHEN A YELLOW LIGHT S
HOWS ALONE ON A TRAFFIC SIGNAL,
AN OPERATOR",MUST BE PREPARED TO
 STOP,SHOULD PROCEED BEFORE IT C
HANGES TO RED
1240 DATA  "A FLASHING YELLOW LI
GHT MEANS",SLOW DOWN AND PROCEED
 WITH CAUTION,JUST KEEP GOING
1250 DATA "A FLASHING GREEN LIGH
T MEANS",GO IF IT IS SAFE,IT IS
SAFE TO GO
1260 DATA "A RED AND YELLOW LIGH
T TOGETHER MEANS","VEHICLES STOP
, PEDESTRIANS CROSS","WATCH OUT
FOR PEDESTRIANS
1270 DATA "YOU MAY PROCEED WHEN
A RED LIGHT IS ILLUMINATED WHEN
YOU ALSO SEE",GREEN ARROWS,FLASH
ING GREEN
1280 DATA "A RED-YELLOW-RED BAND
 ON THE POST OF A TRAFFIC CONTRO
L SIGNAL MEANS","PEDESTRIAN BUTT
ON, PREPARE TO STOP",NOTHING TO
THE DRIVER OF A MOTOR VEHICLE
1290 DATA "WHEN YOU ARE DRIVING
A CAR WHILE YOU HAVE A LEARNER'S
 PERMIT, THE LICENSED DRIVER MUS
T SIT",IN THE FRONT SEAT,DIRECTL
Y BEHIND YOU
5000 DATA END,,
```

CORRECTION

Due to a printing error on our part, Perry Computers' advertisement on Page 16 of last month's issue for the Tandy™ 1000SX computer was incorrectly listed as $175. The correct price is $775.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` **at the CoCo SIG> prompt and** `INFO` **at the TOPIC> prompt.**

Blank Space Underlining

By Marty Goodman
Rainbow Contributing Editor

I'm having trouble using Telewriter 64 *and my daisy wheel printer. When I send my printer the escape code for underlining, it only underlines letters. It does not underline blank spaces. I want to use the underline to create lines in forms I am printing. How can I do this?*

Gregory L. Foster
(HAMMAN)
Wauwatosa, WI

Daisy wheel printers that support escape sequences for underlining typically do so in one or both of two ways. You are describing what is often referred to as "automatic word underline" — once the underline feature is turned on, letters and numbers are underlined but spaces are not. Some printers offer (via another escape sequence) an underline that is not limited to letters and numbers. Check your printer manual to see if the printer does not have another escape sequence documented that supports the other sort of underline.

If your daisy wheel printer does not support general underlining of both letters and spaces via an escape sequence, fear not! Under *Telewriter 64* there is an alternative for you. Use the CTRL `.DP` function to define a printable special control character as the underline character. For example, press CTRL and type `.DP1 95` to define CTRL-1 as the underline character. Then, for the spaces where you want blank underlines, type CTRL-1 instead of a space character.

Be sure to use the CTRL `.DP` function, not the CTRL `.D` function when defining the underline control character. This will allow *Telewriter* to understand it is a printable character for alignment and justification purposes.

RS-232 ROM Disable

How can I disable the ROM on the Deluxe RS-232 Program Pak in order to use it with a Y-cable? Is it OK to use a Y-cable with the Deluxe RS-232 Program Pak?

Robert S. Erlick
(EARLROB)
Philadelphia, PA
and
Gregory L. Foster
(HAMMAN)
Wauwatosa, WI

Generally speaking, it is a bad idea to use a Y-cable.Whenever you do, you introduce the strong possibility of making your system unreliable, particularly during disk I/O. I urge you to get a Multi-Pak Interface instead. The MPI's internal slot select circuitry takes care of the problem of disabling the Deluxe RS-232 Program Pak ROM.

However, as an interim measure, you can probably use a Y-cable if you follow these rules.

Make sure the Y-cable is as short as possible. This means that it should be no more than a total of two inches long. (Preferably shorter.) Get someone familiar with removing and recrimping KELL AM brand connectors to shorten your Y-cable, if you are not familiar with handling such connectors yourself.

Disable the ROM chip. This is done as follows: Open up the RS-232 pack. The pack is held together by a single Philips head screw located underneath the label on the pack, more or less in the center of the pack. On older deluxe RS-232 Program Paks, the 24-pin ROM chip is in a socket. Merely remove the chip and throw it away. Be sure you get the 24-pin ROM chip and not the 28-pin 6551 UART chip.

On some newer RS-232 packs, Tandy soldered the ROM directly to the circuit board. You must remove the board and desolder the chip from the board. This can be done most easily by clipping all the pins on the chip, then using a soldering iron and long needle-nose pliers to remove the 24 severed chip legs one by one. Be sure not to dribble solder. Clean the holes when done with a solder sucker. While some recommend the easier alternative of locating the enable pin, cutting it and tying it to the "chip disabled" (+5) level, this is a poor idea if your intent is to use the pack with a Y-cable. It's best to get it totally out of the circuit.

Please buy a Multi-Pak Interface as soon as you can afford one, for even short Y-cables can cause your CoCo to have intermittent crashes during Disk I/O.

Free Floating Touch Pad

How can I change the Koala Touch Pad sold by Radio Shack so that it is

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW'S *CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

free floating rather than self-centering when the pen is removed?

Vince Casingal
(DESH)
Florida

Sorry, Vince. The hardware of the Koala Touch Pad consists of two resistive sheets. There is no simple way to achieve what you desire.

Consistent Crashes

My CoCo system has problems. It will work for a while, but then it crashes. When I move my disk controller to another CoCo, all is well. When I slightly jostle the bad system, it crashes. Propping up the disk controller in the CoCo slot seems to help. Even gently touching it can crash the system. Any advice? Also, one of my CoCo 2s consistently crashes after it is on for more than 20 mintues. The screen fills with "@" signs. Any ideas about this?

Len Stone
(ELM)
Chicago, IL

While there are many things that could be wrong, your description of the problem makes it sound like the cause is a bad 40 system bus connector on the CoCo in question. Don Hutchison once had a similar problem, and he cured it by removing the 40-pin connector from the CoCo and replacing it with a new one.

The Tandy National Parts part number for that 40-pin connector is 8519094. Specify this as the part for Catalog No. 26-3027 type CoCo 2 when you order. To remove the old connector, first remove the CoCo printed circuit motherboard completely and detach the ground plane from it. Then cut all 40 pins with a cutting plier. One by one, remove those pins using a soldering iron and long-nosed pliers. Then use a solder sucker to remove all excess solder from the holes and clean up the site of the old connector before inserting the new one in place and soldering it in.

The other problem (the CoCo 2 that crashes with a screen full of "@" signs) sounds like it is caused by a marginal and overheating chip on the board. I'd start by replacing the SAM chip. Other possible but less likely causes would be the 6809, the RAM chips and a failing power supply. Note that the "@" character corresponds to a zero in the text screen memory location.

CoCo 2 Monitors

What sort of monitor should I get for displaying text on my CoCo 2? What video driver will I need? If I get a monochrome monitor, what should I do about sound output?

Richard Trasborg
(TRAS)
Staten Island, NY

The best bet for use with text would be a monochrome composite video monitor. These are advertised in RAINBOW for prices ranging from $70 to $100. Monochrome is enormously superior in sharpness to any form of color display on the CoCo 1, 2 or 3, and it costs least of all. Any commercial monochrome monitor driver advertised in RAINBOW should work fine for adapting your CoCo to work with a monochrome monitor. Most such drivers will leave the RF (TV) output undisturbed so that you can still use a color TV for display of games and other software that requires full-color displays. I recommend getting an amber screen monochrome monitor, although others have differing tastes in phosphor color. Nearly any brand of monochrome monitor should work fine. The Magnavox and Amdek brands have especially nice displays.

For sound output I recommend using the Radio Shack Audio Amp/Speaker (Catalog No. 277-1008), which costs $12. It is a little plastic box with a built-in audio amplifier and speaker. It can fit underneath the keyboard on your CoCo if you remove its back cover. It is designed to work off a 9-volt, transistor radio-type battery, but can easily be powered by the CoCo itself. Just locate the big electrolytic capacitor on your CoCo (10,000 mfd). Hook the red wire from the power connector of that amplifier to the plus side of that capacitor and the black wire to the minus side. You'll find that about 10 volts are available at that point in the CoCo power supply. This is ideal for powering that amplifier.

Remote Keyboards

I'm building a rack mount for my CoCo and want to put my CoCo keyboard at the end of a ribbon cable. How long can I safely make such a cable? Also, I am interested in what you can tell me about the Coleco Adam keyboards that Radio Shack is now selling at quite low prices, with a view to possibly using one of those as my remote keyboard.

Bob Rosenbrock
(8PROFTRUDO)
Bluffton, IN

I've been using remote lap keyboards on my CoCo systems for the last four years. I've never had any problems with cables up to 10 feet long. Recently I designed a package to help install a remote keyboard in any model of CoCo 2 or 3. This consists of a 6- to 10-foot shielded ribbon cable attached to special adapter boards that allow easy connection to both the CoCo keyboard socket and to the mylar ribbon cable of the keyboard. Provision is made to facilitate running out reset and power-on lines too. Spectrum Projects is selling this device.

Stay away from the Coleco Adam keyboard and all other non-CoCo keyboard specials available from Radio Shack's surplus deals. The Adam keyboard has a completely different matrix from that of the CoCo, and it is impossible to alter its wiring because it is all on a mylar film. Even with other surplus keyboards that are based on printed circuit boards, it is far too much hassle to rewire them.

Instead buy a genuine CoCo 2 or CoCo 3 keyboard. These are available from National Parts, Computer Plus or Spectrum Projects. The one exception is that the Model 3 and Model 4 keyboards are almost (but not quite) exactly like the matrix wiring of the CoCo 2 and 3, respectively. If you can get a deal on one of these, it might be worth it, for only part of a single pair of rows needs to be rewired, and the ALPS brand Model 3 and 4 keyboards have a very nice feel to them. Be sure to get the schematic of these keyboards and of the CoCo keyboard to facilitate making the needed modifications!

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

BASIC TRAINING

Getting Acquainted

By Joseph Kolar
Rainbow Contributing Editor

Having purchased a CoCo 3 to replace an ailing CoCo 1, I began to fool around with it to get the feel of the new machine. It was both an exhilarating and disappointing experience. How would the improved computer affect the newcomer in his attempt to master the CoCo 3?

The newcomer should have little trouble getting acquainted with the new version of the old CoCo. Having no preconceived notions, he should have no problem that cannot be overcome. However, the owner of an older CoCo, imbued with the programming lore of the previous models, must learn programming techniques that are somewhat different from those to which he has become accustomed.

In effect, he has to learn how to program two computers. He must know the "old system," which included Hi-Res graphics. Under the constraints of the new CoCo, the veteran reader of this column is forced to view the old Hi-Res as a new Lo-Res. He must teach himself distinct yet parallel programming techniques with somewhat different statements or commands.

My free advice is for the newcomer, who has recently joined the CoCo Community, to master the Lo-Res graphics first. Then, when he is comfortable with the Lo-Res graphics, to venture into the new world of CoCo 3 Hi-Res graphics. Then, and only then, will he keep the two techniques separated in his mind.

Today, we will treat you to a little of both. First, we will write a printed name in Lo-Res graphics, just as if you had written it in a way that connected all the letters together in one flowing line as in a signature, proceeding from one letter to the next in a continous line.

The result is Line 20 in Listing 1. Key it in at this time. Critiquing this effort, the first thing that stands out is that the B is a poor creation and appears to clash with the print font used in the rest of the name.

Underneath, in Line 30, we create an alternate B. We note that the A might look better if it were wider. We position ourselves under the A in Belinda. This is done easily using the old trial and error ploy. We move `BR`*x* spaces to the right and use `U6` as the locator. When we adjust the value *x* until it sits under the left-vertical leg of A, we have succeeded. We recreate the A to make it wider by adding one unit to each of the two horizontal values. The resultant A looks too wide, but the original A is too narrow.

Speaking of narrow, the M is guilty of the same offense. So, let us locate `U6` under the left-vertical leg of M and create a wider M.

We notice that Y looks too flimsy, so we relocate `U6` under the vertical leg of Y with `BR`*x*. We recreate a wider Y. You may want to move the new Y over so that it lines up along the left arm of the Y. The result is OK and these letters constitute the completed Line 30.

The revised B still looks sick. In Line 40, we create a B with a wider bottom segment. The D might look better if we make it a bit wider on the horizontal plane. Relocate under the left vertical of D. To make it easy, use `U16`. Now, we recreate a wider D.

It is time to check out our work and see how our new letter fits into Line 20. If you are chicken, make a new program line, Line 50, and a revised Line 20. Note that L is three units wide, and I is only one unit wide.

If you start a Line 50, you quickly get disillusioned. It is easier said than done. Whatever part you completed, type `DEL50` and save Listing 1.

After saving a listing using a tape system, note its starting and ending counter-locating numbers. Rewind the tape until it is a digit or two less than the starting counter number. Set cassette to play, key in `SKIPF` and press `ENTER`.

If all is well, CoCo will oblige and search, using S, for the program. When CoCo finds it, it will announce it with an F and the name, run through it, display OK and stop. This happy state of affairs indicates that CoCo found and verified a good `CSAVE`. You can relax and wipe the program out of memory with a clear conscience.

If you got an I/O message, you know that your `CSAVE` is doomed. Since your program is still safe in CoCo, advance

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Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

a few counter digits past the end of the bad CSAVE and CSAVE it again. Verify for a good CSAVE as explained above.

I use SKIPF instead of SKIPF*x*, where *x* is the program name, because I am only interested in checking the last program (title irrelevent) that was CSAVED, and SKIPF will pick up the next program.

We are going to use last month's technique to chop up the DRAW LINE 20 and make revisions. This is great practice. To quickly separate each letter in Line 20, insert a space right in front of each BR3, BR4 or BR5 in the line. A space exists after BR6 to separate BELINDA from RAMSEY. You might want to place a semicolon in front of and after BR6. Every little marker is a guide to help you. Devise your own system, and use it!

You may want to delineate letters in lines 30 and 40. Place a semicolon at both ends of BR34, BR19 and BR18 in Line 30 and BR26 in Line 40. All our replacement letters are identified. Press CLEAR.

Since our first replacement letter is the second revision of B, it is in Line 40. Type LIST40 EDIT20. Substitute the new B for the old B. You can either delete the characters that made the old B and replace them with the new characters from Line 40 or alter only the characters necessary to make the new B. Now run. The next case on our agenda is to replace the old D with the new D in Line 40.

Press CLEAR and type LIST40 EDIT20. We know the D is the second letter in front of BR6, the word separator. You can see that only two characters need changing. A simple substitution did the trick. Now run.

Next, we need an A from Line 30. Press CLEAR and type LIST30 EDIT20. The characters that comprise A begin after BR34, up to and including the next semicolon. The first A we shall replace is the A in front of BR6.

We do not disturb BR4 because it is a letter separator. Only two characters need to be changed. Run. On your own, replace the second A in Line 20. Run.

Press CLEAR. Since M is the third letter in Line 30, type LIST30 EDIT20. This time, it is wise to locate the new M and copy it on scrap paper. Type U6F3E3D6. Now, pick up the old M in Line 20, about 150 characters into Line 20. Replace 3s for 2s. The scrolling didn't push the desired information in Line 30 off the screen, but it could have if any of the lines were longer. So it's better to be safe than sorry and make a note of the proposed change on scrap paper. Now run.

On your own initiative, exchange the Ys. Looking at the end product, another space between S and E is called for. Locate that spot in Line 20 and add an extra space. Now add a space between B and E and between E and Y. What do I mean by a space? Do it!

Add two spaces to separate the words more distinctly. That looks good! Type DEL30-40, since we do not need the samples anymore.

You may want to widen the N. Consider how you would reshape it. But first, relocate BELINDA RAMSEY, (H,V). I chose (34,98).

Now, let us figure out how to widen the N. Begin a Line 30 by typing 30 DRAW"BM34,118. I decided upon U6F5NU5D".

Press CLEAR and type LIST30 EDIT20. It is about 65 characters into Line 20. Make the appropriate changes and deletions and run.

It looks pretty professional. Now type DEL30 and save it as Listing 2.

Our next order of business is my first cautious step in experimenting with CoCo 3 to see what was what. If you own the new kid on the block, refer to your manual for an overview. If you do not and are curious about what the big hue and cry is all about, read on. Perhaps you may be impelled to get the new, truly inexpensive Super CoCo.

If you are the proud owner of a CoCo 3, key in KOKONUT. If you own an older model, read the listing and follow along to get a preview of what to expect. Note that for the PRINT" " lines, all the statements are strange critters. Even the PRINT" " works a bit oddly in this instance.

In effect, you are confronted with a new set of statements that have equivalents to what you are accustomed to in the older CoCos.

Now run. You should see three different ribbons of different colored text on a light background.

WIDTH40 tells CoCo to get into the mode that allows us to create on a screen 40 characters/spaces wide, as compared with the traditional 32 and 24 rows, as opposed to the 16. On this Hi-Res screen, CoCo affords us the luxury of printing upper- and lowercase text.

Note the blinking line of text. Line 16 positions the cursor at a given column/row location using grid coordinates. Using LOCATE*x*,*y*, starting with 0, going on up to 39, read right to find *x*. Then starting with 0 through 23, read down to find *y*. LOCATE is very easy to use as compared with the familiar PRINT@*x* command that requires us to memorize the locations from 0 to 511 that make up the 32-by-16 text screen. Thus, the rule to follow using LOCATE is "count right then count down."

To see this in action, change Line 16 to LOCATE0,0 and run. Then change it to (5,20) and run. The entire colored strip with text included moved as a unit, without disturbing the other lines of text. Try coordinates (25,23) and then (0,24). The first wraps around to the next row and the second announces an F/C Error message due to asking CoCo to do the impossible.

The reason it moved the blinking text on the colored strip is due to lines 20 and 30. ATTRa,b,B,U tells CoCo the foreground color designated (a) and the background color desired (b). Both a and b values range from 0 through 7. The B option activates the blinking and the U option underlines the text. Add ,U to Line 20 and run. All we succeeded in doing was crowding in our text, proving it to be of no value in this instance. Restore Line 20 to its original state. Line 30 prints our legend. Notice that the semicolon, which chops off the blue background, provides one blank space at the end of the blue ribbon.

The second line of text is located in Line 40, colors chosen in Line 50 and selected text in Line 60. In order to maintain symmetry, an extra space was inserted between names. Note the two ending blank spaces. Only one was included in Line 80. The semicolon, hacking off the orange ribbon, provided the second blank space to create symmetry.

Similarly, the last line of text is developed in lines 70 through 90. This line of text uses the U option to an advantage. Add ,U to Line 80 and run. Now, remove the semicolon from Line 90 and run. Isn't this effect neat?

Restore Line 80 by removing ,U. Run, press BREAK and run again. It must be run twice to throw unwanted lines out of memory.

Line 95 is a ploy used to get the cursor out of the way. It is shunted to the upper left-hand corner and does not detract from the display.

Line 5 contains a very useful command. We are all too familiar that when we press BREAK the program stops, period. Using ON BRK GOTO*x* where *x* is a designated line, we can advance to a useful area of the program. In this case, Line 5 directs CoCo to go to Line 200.

Line 200 returns to the ordinary Lo-Res screen (32-by-16) and, since we might be adding more lines to a program in progress, we ask CoCo to list the rest of the program starting with Line 100. I can now add or insert more lines using the regular format that is so familiar to me.

We read THE RAINBOW to expand our knowledge of CoCo. On Page 78 in the March 1987 issue, Eric White shows us how to use the ALT, CTRL, F1 and F2 keys in our programs.

Being a quick learner, the wheels turned in my mind, and the result is Line 199. It states: If the CTRL key is pressed, go to Line 300 or else loop until pressed. Line 300 returns to the regular 32-by-16 screen, and CoCo is asked to `LIST` up to Line 100.

If I want to see the latter part of the program, I press BREAK. I cover all bases. If I want to check or refer to the front part of the program, I press CTRL.

Save `KOKONUT`. Look at `KOKONUT1`. Change Line 5 in `KOKONUT`, which you still have in memory, from 200 to 300. Then type `DEL199-`. Key in Lines 199 through 300 from `KOKONUT1`.

Line 199 states that if the ALT key is pressed, locate on Row 11, and if the CTRL key is pressed, locate on Row 15. In either case, print the message in Line 200.

Then run if the F1 key is pressed. But, if the F2 key is pressed, `LIST` the program in a 40-by-24 format. Otherwise, wait patiently until one or the other of the function keys is activated.

If pressed, the BREAK key sends CoCo to Line 300, reverting to the 32-by-16 text screen, and lists the last part of the program.

Note that there is a certain sequence of key pressings required to force CoCo to `LIST` the program in Hi-Res (40-by-24) format. Fool around and discover the sequence for yourself. Remember, you can `EDIT` from either listing: Line 200, if F2 is pressed, and Line 300, if BREAK is pressed. Save `KOKONUT1`.

I have noted that on both of my TVs, in `WIDTH 40`, the left, 0 column falls off the display. This is also the case with my Brand X computer. Therefore, such a listing can be annoying to use. That is why I prefer to use `WIDTH 32`, avoiding the bother of reading incomplete line numbers and the increased chances of making errors.

If you are experiencing this problem, one way to avoid incomplete program line numbers is to begin your program with Line 1000, advancing in increments of 10, so that you know that the hidden digit is a 1.

This foible of my TV is also the reason I hide the cursor at `LOCATE,0`, which effectively removes it from sight.

A nice effect is to add `,U` in Line 80 of `KOKONUT1`. This will provide 24 lines and places the listing on a legal-pad screen. I can't say it is useful — just different. Note that if you type `NEW`, the lines remain. This is because CoCo retains them in memory. It is up to you to get rid of the ruled lines.

Thanks to hints provided by THE RAINBOW, we managed to use the four relatively useless keys as thinly disguised `ON BRK GOTO`*x* keys. We found a versatile use for the ALT, CTRL, F1 and F2 keys. They are truly an enhancement for our cassette-based CoCo 3. The moral of the story: It pays to read THE RAINBOW carefully. ☐

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16K ECB

Listing 1:

```
0 '<LISTING1>
10 PMODE4,1:PCLS:SCREEN1,0
20 DRAW"S8BM42,70U6R3D3NL3RD3NL4
BR3NR4U3NR3U3R4BR3D6R3BR3NU6BR3U
5NUF4NU5DBR3U6R3FD4GNL3BR4U5ER2F
D3NL4D2BR6 U6R3FD2GLNL2F2BR3U5ER
2FD3NL4D2BR3U6F2E2D6BR3BUFR2EUHL
2HUER2NFBR3NR4D3NR3D3R4BR5U4NH2E
2"
30 DRAW"BM42,90U6R3FDGNL3FDGNL3B
R34U5ER3FD3NL5D2BR19U6F3E3D6BR18
U3NH3E3"
40 DRAW"BM42,110 U6R3FDGNL3RFDGN
L4BR26U6R4FD4GNL4"
100 GOTO 100
```

16K ECB

Listing 2:

```
0 '<LISTING2>
10 PMODE4,1:PCLS:SCREEN1,0
20 DRAW"S8BM34,98U6R3FDGNL3RFDGN
L4 BR4NR4U3NR3U3R4 BR3D6R3 BR3NU
6 BR3U6F5NU5D BR3U6R4FD4GNL4 BR4
U5ER3FD3NL5D2;BR8;U6R3FD2GLNL2F2
 BR3U5ER3FD3NL5D2 BR3U6F3E3D6 BR
3BUFR2EUHL2HUER2NF BR4NR4D3NR3D3
R4 BR6U3NH3E3"
100 GOTO 100
```

CoCo 3

Listing 3:

```
0 '<KOKONUT>
5 ON BRK GOTO200
10 WIDTH40
16 LOCATE8,2
20 ATTR 3,2,B
30 PRINT" Tutorial For Kokonuts"
;
40 LOCATE11,5
50 ATTR4,7
60 PRINT"  JOSEPH  KOLAR ";
70 LOCATE8,8
80 ATTR2,4
90 PRINT" INVERNESS, FL., 32650"
;
95 LOCATE0,0
199 IF PEEK(342)=191 THEN GOTO30
0 ELSE GOTO199
200 WIDTH32:LIST100-
300 WIDTH32:LIST-100
```

CoCo 3

Listing 4:

```
0 '<KOKONUT1>
5 ON BRK GOTO300
10 WIDTH40
16 LOCATE8,2
20 ATTR 3,2,B
30 PRINT" Tutorial For Kokonuts"
;
40 LOCATE11,5
50 ATTR4,7
60 PRINT"  JOSEPH  KOLAR ";
70 LOCATE8,8
80 ATTR2,4
90 PRINT" INVERNESS, FL., 32650"
;
95 LOCATE0,0
199 IF PEEK(341)=191 THEN LOCATE
 12,11 ELSE IF PEEK(342)=191 THE
N LOCATE 12,15 ELSE GOTO 199
200 PRINT"  HELLO THERE! ";:LOCA
TE0,0
201 IF PEEK(343)=191 THEN RUN EL
SE IF PEEK(344)=191 THEN LIST EL
SE 201
300 WIDTH32:LIST100-
```

DataPack II Plus V4.1

SUPER SMART TERMINAL PROGRAM
AUTOPILOTand AUTO-LOG Command Processors
X-MODEM DISK FILE TRANSFER SUPPORT
VT-100 & VT-52 TERMINAL EMULATION

- No lost data using Hi-Res Display, Even at 1200 Baud on the Serial port.
- 9 Hi-Res Displays, 28 to 255 columns by 24 lines & true Upper/Lower case.
- 45K Text Buffer when using the Hi-Res Text Display and Disk .
- ASCII & BINARY disk file transfer support via XMODEM.
- Directly record receive data to a disk file while online.
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Disto Controller w/80 column card & parallel printer
PBJ Parallel Printer Card and Dual Serial Port (2SP-Pak)
R. S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 32K & Disk, Only $59.95

HI-RES II Screen Commander

Tired of looking at the 16 line by 32 character display on your CoCo? Wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without extra hardware.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen.

HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

Only 24.95 on Tape or $29.95 on Disk

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Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code. And "The Source" has all the features and functions you are looking for in a Disassembler.

- Automatic Label generation and allows specifying FCB, FCC and FDB areas.
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- Built in Disk Directory and Kill file commands.
- Menu display with single key commands for smooth, Easy operation.
- Written in fast machine language, one of the easiest to use Disassemblers

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TEXTPRO III
"The Advanced Word Processing System"

- 9 Hi-Res Displays from 28 to 255 columns by 24 lines & Upper/Lower Case
- Three Programmable Header lines that can be re-defined at anytime.
- Programmable Footer line & Automatic Footnote System.
- 10 Programmable Tab stops & 7 Powerfull Tab Function Commands.
- Completely Automatic Justification, Centering, Flush left and right.
- On screen display of underline and Double size characters.
- Change indents, margins, line length, etc. parameters anytime in the text.
- Create and Edit files larger than memory, up to the size of a full disk.
- Easily imbed any number of format and control codes.
- Automatic Memory sense 16-64K with up to 48K of memory workspace.
- Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO III is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

DISK $59.95 TAPE $49.95

The CBASIC Editor/Compiler V1.1.2

Do you want to write fast machine language programs but you don't want to spend the next few years trying to learn how ???

Well with CBASIC, you could be writing them right now!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly. We added advanced features like a full blown program editor, Hi-Res text Displays and 80 column hardware support for editing, compiling and your compiled programs. Plus we made it exceptionally easy to use, CBASIC is the friendliest and easiest compiler available for the Color Computer.

"The most complete Editor/Compiler I have seen for the CoCo... "
--The RAINBOW, March 1986

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will do it for you automatically. Or, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate printer & serial I/O baud rates. You can send and receive data with PRINT, INPUT and INKEY commands.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and more.

"The Editor is a very good one and could be the subject for review all by itself..." *--The RAINBOW, March 1986*

"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride. *-- Hot CoCo, Feburary 1986*

The documentation for CBASIC is an 8 1/2 * 11 Spiral Bound book which contains approximatly 120 pages of real information.

"CBASIC's manual is easy to read and written with a minimum of technicalese." *--Hot CoCo February, 1986*

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not JDOS compatible.

"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.." *-- Hot CoCo February, 1986*

"A Complete Editor/Compiler Well Worth its Price" --RAINBOW March 1986

EDT/ASM 64D
64K DISK EDITOR ASSEMBLER

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily and it supports Column cards. The disk also contains a free standing ML Debug Monitor, to help you debug your assembled programs.

This is the most powerfull, easy to use Text Editor available in any Editor/ Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material.

- Local and Global string search and/or replace.
- Full screen line editing with immediate line update.
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- Supports Word-Pak I ,II. & R.S. and Disto 80 column display cards.

The Assembler portion of EDT/ASM 64D features include:

- Supports the full 6809 instruction set.
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- Generates listings to Hi-Res text screen or printer.
- Assembles directly to disk or tape in LOADM format.
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- Allows assembly from editor buffer, Disk or both.

The freestanding DEBUG program provided includes:

- Examine and change the contents of memory.
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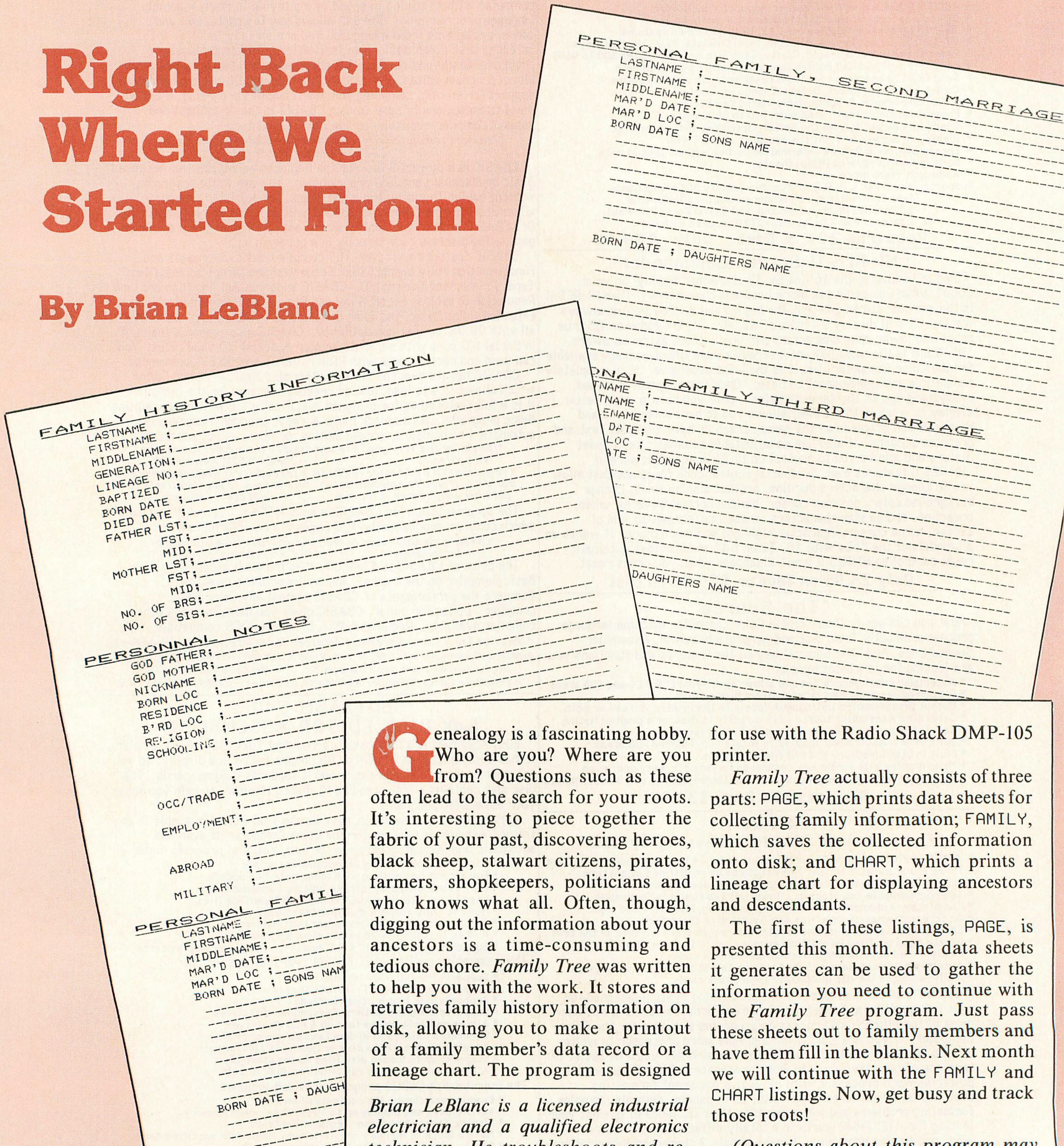
Right Back Where We Started From

By Brian LeBlanc



PERSONAL FAMILY, SECOND MARRIAGE
LASTNAME ;
FIRSTNAME ;
MIDDLENAME;
MAR'D DATE;
MAR'D LOC ;
BORN DATE ; SONS NAME

BORN DATE ; DAUGHTERS NAME

NAL FAMILY,THIRD MARRIAGE
NAME ;
TNAME ;
ENAME;
DATE;
LOC ;
TE ; SONS NAME

DAUGHTERS NAME

FAMILY HISTORY INFORMATION
LASTNAME ;
FIRSTNAME ;
MIDDLENAME;
GENERATION;
LINEAGE NO;
BAPTIZED ;
BORN DATE ;
DIED DATE ;
FATHER LST;
FST;
MID;
MOTHER LST;
FST;
MID;
NO. OF BRS;
NO. OF SIS;

PERSONNAL NOTES
GOD FATHER;
GOD MOTHER;
NICKNAME ;
BORN LOC ;
RESIDENCE ;
B'RD LOC ;
RELIGION ;
SCHOOLING ;
OCC/TRADE ;
EMPLOYMENT ;
ABROAD ;
MILITARY ;

PERSONAL FAMIL
LASTNAME ;
FIRSTNAME ;
MIDDLENAME;
MAR'D DATE;
MAR'D LOC ; SONS NAM
BORN DATE ;

BORN DATE ; DAUGH

Genealogy is a fascinating hobby. Who are you? Where are you from? Questions such as these often lead to the search for your roots. It's interesting to piece together the fabric of your past, discovering heroes, black sheep, stalwart citizens, pirates, farmers, shopkeepers, politicians and who knows what all. Often, though, digging out the information about your ancestors is a time-consuming and tedious chore. *Family Tree* was written to help you with the work. It stores and retrieves family history information on disk, allowing you to make a printout of a family member's data record or a lineage chart. The program is designed for use with the Radio Shack DMP-105 printer.

Brian LeBlanc is a licensed industrial electrician and a qualified electronics technician. He troubleshoots and repairs industrial computers and programmable controllers. Brian holds eight diplomas from various computer courses, and he lives in Digby County, Nova Scotia.

Family Tree actually consists of three parts: `PAGE`, which prints data sheets for collecting family information; `FAMILY`, which saves the collected information onto disk; and `CHART`, which prints a lineage chart for displaying ancestors and descendants.

The first of these listings, `PAGE`, is presented this month. The data sheets it generates can be used to gather the information you need to continue with the *Family Tree* program. Just pass these sheets out to family members and have them fill in the blanks. Next month we will continue with the `FAMILY` and `CHART` listings. Now, get busy and track those roots!

(Questions about this program may be directed to the author at RR1 Church Point Box 67-B, Digby County, Nova Scotia, Canada B0W 1M0. Please enclose an SASE when writing for a reply.). ☐

290	186	1060	75
470	248	1230	253
650	96	1470	146
850	248	END	39

The listing: PAGE

```
90 REM (C) BRIAN LE BLANC
95 REM JANUARY 24 1987
100 CLS
110 PRINT #-2,CHR$(30)
120 PRINT #-2,CHR$(27);CHR$(22)
130 DIM A$(137):WIDTH 40
140 GOSUB 1070
150 PRINT"THIS PROGRAM WILL MAKE
 PRINTOUTS OF"
160 PRINT"PAGES ONE AND TWO OF T
HE"
170 PRINT"FAMILY TREE PROGRAM"
180 PRINT"----------------------
------------"
190 PRINT "HOW MANY COPIES OF PA
GE ONE"
200 LINEINPUT Q$
210 LET PGONE=VAL(Q$)
220 PRINT"HOW MANY COPIES OF PAG
E TWO"
230 LINEINPUT Q$
240 PRINT"----------------------
------------"
250 TWO=VAL(Q$)
260 J=95
270 LOCATE 1,10:PRINT "ENSURE TO
P OF PRINTER PAGE"
280 LOCATE 1,12:PRINT " IS FLUSH
 WITH ROLLER"
290 LOCATE 1,14:PRINT "PRESS (P)
 TO PRINT,OR (Q) TO QUIT"
300 Q$=INKEY$ :IF Q$="" THEN 300
310 IF Q$="Q" THEN 1050
320 IF Q$<>"P" THEN 300
330 FOR I=1 TO 47:PRINT #-2,CHR$
(27);CHR$(54):NEXT I
340 IF PGONE=0 THEN 710
350 FOR X=1 TO PGONE
360 PRINT #-2,CHR$(15);CHR$(27);
CHR$(14)
370 PRINT #-2,CHR$(27);CHR$(21)
380 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
390 PRINT #-2,"FAMILY HISTORY IN
FORMATION"
400 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
410 PRINT #-2,CHR$(27);CHR$(15);
CHR$(14)
420 FOR I=1 TO 16
430 PRINT #-2,TAB(6);A$(I);CHR$(
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

MLBASIC 2.0 - BASIC Compiler

The wait is over. WASATCHWARE announces the latest version of MLBASIC designed to allow more compatibility with existing BASIC programs than ever available before for the Color Computer. This version also allows full use of the capabilities and memory of the CoCo 3. Written in machine language, MLBASIC can compile programs as large as 64K bytes. Standard floating point (10 digit precision), INTEGER, and String type variables and arrays supported.

COMMANDS SUPPORTED:

1. I/O commands
   CLOSE CLOADM CSAVEM DIR DRIVE DSKI$ DSKO$ FIELD
   FILES GET INPUT KILL LSET OPEN PRINT PUT
   RSET USING LINEINPUT
2. Program control commands
   CALL DEFUSR END EXEC FOR NEXT GOSUB GOTO
   IF THEN ELSE ERROR ON RETURN STOP USR
3. Functions
   ABS ASC ATN COS CVN EOF EXP FIX
   HPOINT INSTR INT LEN LOG LPEEK LOC LOF
   PEEK POINT PPOINT RND SGN SIN SQR TAN
   TIMER VAL VARPTR
4. String functions
   CHR$ INKEY$ LEFT$ MID$ MKN$ RIGHT$ STR$ STRING$
5. Graphic/Screen commands
   ATTR COLOR CLS CIRCLE DRAW HCOLOR HSCREEN HDRAW
   HLINE HPAINT HPRINT HRESET HCIRCLE HCLS HSET JOYSTK
   LINE LOCATE PALETTE PAINT PCLEAR PCLS PLAY PMODE
   PRESET PSET RESET SCREEN SET SOUND WIDTH
6. Other commands
   DATA DIM MOTOR POKE LPOKE RESTORE READ REM
   TRON TROFF TAB VERIFY

Plus many more commands not available with regular BASIC which allow interfacing with hardware registers and machine language programs.

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Salt Lake City, Utah 84121
Phone (801) 943-6263

```
28);CHR$(50);CHR$(J)
440 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
450 NEXT I
460 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
470 PRINT #-2,CHR$(15);CHR$(27);
CHR$(14)
480 PRINT #-2,"PERSONNAL NOTES"
490 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
500 PRINT #-2,CHR$(27);CHR$(15);
CHR$(14)
510 FOR I=17 TO 35
520 PRINT #-2,TAB(6);A$(I);CHR$(
28);CHR$(50);CHR$(J)
530 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
540 NEXT I
550 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
560 PRINT #-2,CHR$(15);CHR$(27);
CHR$(14)
570 PRINT #-2,"PERSONAL FAMILY,F
IRST MARRIAGE"
580 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
590 PRINT #-2,CHR$(14);CHR$(27);
CHR$(15)
600 FOR I=36 TO 58
610 IF I=41 OR I=50 THEN FLAG=1
620 IF I>41 THEN H=60 ELSE H=50
630 IF FLAG<>1 THEN PRINT #-2,TA
B(6);A$(I);CHR$(28);CHR$(H);CHR$
(J)
640 IF FLAG=1 THEN PRINT #-2,TAB
(6);A$(I)
650 FLAG=0
660 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
670 NEXT I
680 PRINT #-2,CHR$(27);CHR$(22)
690 REM LINE FEED
700 NEXT X
710 IF TWO=0 THEN END
720 FOR X=1 TO TWO
730 PRINT #-2,CHR$(27);CHR$(21)
740 PRINT #-2,CHR$(27);CHR$(90);
CHR$(36)
750 PRINT #-2,CHR$(15);CHR$(27);
CHR$(14)
760 PRINT #-2,"PERSONAL FAMILY,
SECOND MARRIAGE"
770 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
780 PRINT #-2,CHR$(14);CHR$(27);
CHR$(15)
```

```
790 FOR I=59 TO 81
800 IF I=64 OR I=73 THEN FLAG=1
810 IF I>64 THEN H=60 ELSE H=50
820 IF FLAG<>1 THEN PRINT #-2,TA
B(6);A$(I);CHR$(28);CHR$(H);CHR$
(J)
830 IF FLAG=1 THEN PRINT #-2,TAB
(6);A$(I)
840 FLAG=0
850 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
860 NEXT I
870 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
880 PRINT #-2,CHR$(15);CHR$(27);
CHR$(14)
890 PRINT #-2,"PERSONAL FAMILY,T
HIRD MARRIAGE"
900 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
910 PRINT #-2,CHR$(14);CHR$(27);
CHR$(15)
920 FOR I=82 TO 104
930 IF I=87 OR I=96 THEN FLAG=1
940 IF I>87 THEN H=60 ELSE H=50
950 IF FLAG<>1 THEN PRINT #-2,TA
B(6);A$(I);CHR$(28);CHR$(H);CHR$
(J)
960 IF FLAG=1 THEN PRINT #-2,TAB
(6);A$(I)
970 FLAG=0
980 PRINT #-2,CHR$(27);CHR$(90);
CHR$(12)
990 NEXT I
1000 PRINT #-2,CHR$(27);CHR$(22)
1010 FOR I=1 TO 15
1020 PRINT #-2,CHR$(27);CHR$(54)
1030 NEXT I
1040 NEXT X
1050 END
1060 REM SUB SCREEN DISPLAY ARRA
Y
1070 FOR I=1 TO 136
1080 READ Q$
1090 LET A$(I)=Q$
1100 NEXT I
1110 DATA LASTNAME  ;,FIRSTNAME
;,MIDDLENAME;
1120 DATA GENERATION;,LINEAGE NO
;,BAPTIZED   ;
1130 DATA BORN DATE ;,DIED DATE
;,FATHER LST;
1140 DATA "       FST;","
MID;",MOTHER LST;
1150 DATA "       FST;","
MID;",NO. OF BRS;
1160 DATA NO. OF SIS;,GOD FATHER
```

```
;,GOD MOTHER;
1170 DATA NICKNAME  ;,BORN LOC
;,RESIDENCE ;
1180 DATA B'RD LOC  ;,RELIGION
;,SCHOOLING ;
1190 DATA "          ;","
  ;","          ;"
1200 DATA OCC/TRADE ;,"
 ;",EMPLOYMENT;
1210 DATA "          ;","
  ;",ABROAD    ;
1220 DATA "          ;",MILITARY
 ;,LASTNAME  ;
1230 DATA FIRSTNAME ;,MIDDLENAME
;,MAR'D DATE;
1240 DATA MAR'D LOC ;,BORN DATE
; SONS NAME
1250 DATA " "," "," "
1260 DATA " "," "," "
1270 DATA " "," ",BORN DATE ; DA
UGHTERS NAME
1280 DATA " "," "," "
1290 DATA " "," "," "
1300 DATA " "," ",LASTNAME  ;
1310 DATA FIRSTNAME ;,MIDDLENAME
;,MAR'D DATE;
1320 DATA MAR'D LOC ;,BORN DATE
; SONS NAME
1330 DATA " "," "," "
1340 DATA " "," "," "
1350 DATA " "," ",BORN DATE ; DA
UGHTERS NAME
1360 DATA " "," "," "
1370 DATA " "," "," "
1380 DATA " "," ",LASTNAME  ;
1390 DATA FIRSTNAME ;,MIDDLENAME
;,MAR'D DATE;
1400 DATA MAR'D LOC ;,BORN DATE
; SONS NAME
1410 DATA " "," "," "
1420 DATA " "," "," "
1430 DATA " "," ",BORN DATE ; DA
UGHTERS NAME
1440 DATA " "," "," "
1450 DATA " "," "," "
1460 DATA " "," ",SEARCHING CAN
BE BY;
1470 DATA "         ",LASTNAME  ;,
FIRSTNAME ;
1480 DATA MIDDLENAME;,GENERATION
;,LINEAGE # ;
1490 DATA BAPTIZED  ;,"    ","
          BORN      DIED"
1500 DATA SPECIFIC  ;
UP TO     ;         ,AFTER
;
1510 DATA FROM      ;         ,
TO        ;
1520 DATA " "
1530 DATA DATES MUST BE ENTERED
AS;,"       ----",YEAR MONTH DAY
 ;YYYYMMDD
1540 DATA " "
1550 DATA 1/ENTER DATA,2/SEARCH
FILES
1560 DATA 3/QUIT,"    "
1570 DATA "     "
1580 DATA 1/DISPLAY RECORD,2/PRI
NTOUT COMPLETE RECORD
1590 DATA 3/PRINTOUT PARTIAL REC
ORD,4/DISPLAY NEXT RECORD
1600 DATA 5/CHANGE RECORD,6/RETU
RN TO MENU
1610 DATA " "
1620 RETURN
```

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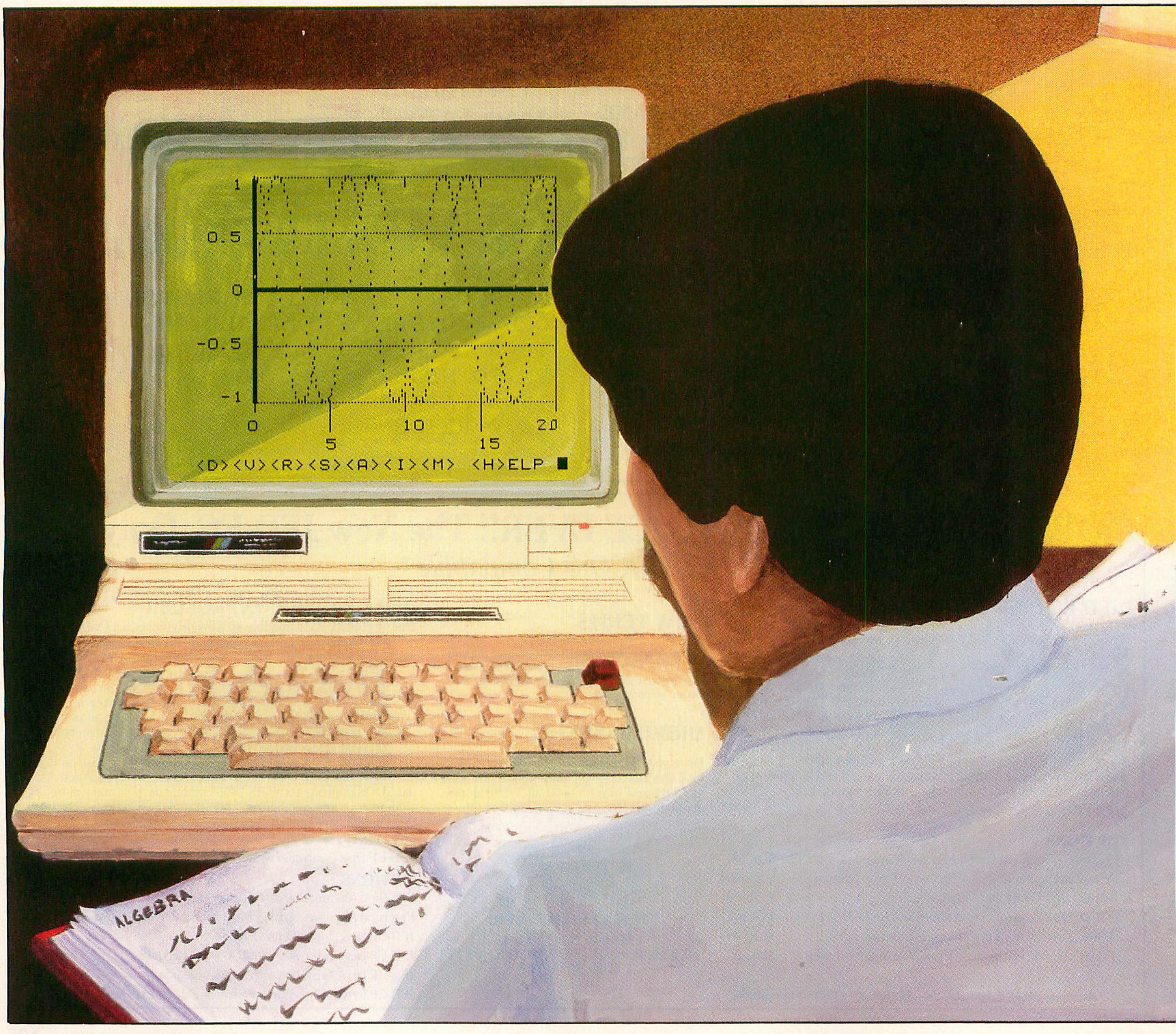
The Electronic Blackboard

By Louis R. Toscano


1
0.5
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-0.5
-1
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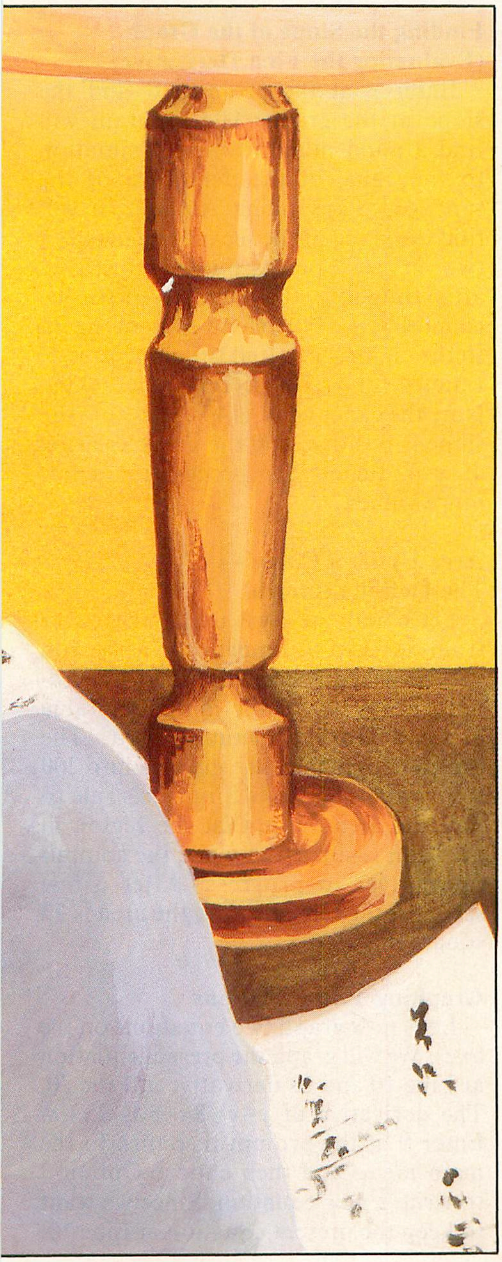
10
15
20
<D><V><R><S><A><I><M> <H>ELP
ALGEBRA

32K
ECB



Roots and Graphs of Functions is a high resolution graphics program that I have used with a great deal of success in my calculus class. Although the program can be used for problem-solving by students of science and mathematics, it is also very effective as an electronic blackboard in the advanced mathematics classroom. Using the program, I have been able to demonstrate in a few minutes mathematical concepts that might otherwise have taken hours of chalk and blackboard work. One picture is worth a thousand Delta-Epsilon proofs!

The program will:

1. Graph any function over any interval
2. Graph two functions simultaneously on the same set of axes
3. Find the roots of a function (the x-intercepts of its graph)
4. Evaluate a function for any value of x
5. Find the intersection of the graphs of two functions (solves a system of two equations with two unknowns)
6. Find the slope of the graph of a function (evaluates the first derivative)
7. Find the relative maximum and minimum values of a function
8. Find the area between a curve and the x-axis (the definite integral)
9. Find the area between two curves
10. Graph piecewise and discontinuous functions.

Here are some of the ways I have used the program in my calculus class:

- To show the relationship between the graph of a function and its first and second derivative
- To compare the graph of $f(x)$ with $f(x-h)$, $f(x)+k$, $-f(x)$, and $-f(-x)$, (i.e., to show the effect of horizontal and vertical translations, and reflections across the x-axis and the origin)
- To demonstrate the effect of changing the parameters of $y=A\sin(bx+c)$ and $y=A\cos(bx+c)$ on the amplitude, period and phase angle
- To show the relationship between the graph of the quadratic function $y=ax^2+bx+c$ and the value of the discriminant b^2-4ac
- To visually "prove" trigonometric identities such as $\sin 2x=2\sin x\cos x$ by showing that the graphs of $y=\sin 2x$ and $y=2\sin x\cos x$ coincide over any x-interval
- To show that the derivative of $\sin x$ is $\cos x$ by comparing the slope of $\sin x$ with values of $\cos x$ at various points. In a similar manner, show that the derivative of e^x is e^x and the derivative of $\mathrm{LOG}x$ is $1/x$
- To show that the integral of $1/x$ from $x=1$ to N is LOGN by comparing the area under $1/x$ from 1 to N and the value of LOGN
- To demonstrate that $\sin x=x$ for small value of x (in radians) by graphing $y=\sin x$ and $y=x$ and showing that

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Louis Toscano has a bachelor's degree in electrical engineering and a master's degree in mathematics. He teaches calculus and computer programming at Martha's Vineyard Regional High School in Massachusetts, and he is currently working on a program similar to Graph *that will graph polar and parametric equations.*

their graphs coincide over the interval where x is very small

- To show that the limit as x approaches 0 of $(\sin x)/x$ is 1 by graphing $y=(\sin x)/x$ in the vicinity of $x=0$
- To demonstrate the Taylor Series expansion of $\sin x$ by graphing $y=\sin x$ and $y=x-x^3/3!+x^5/5!-x^7/7!+\ldots$ and to show that the graphs coincide better as more terms of the expansion are used. Similarly, use the Taylor Series expansion for $\cos x$ and e^x
- To demonstrate the use of Fourier Series to approximate square and triangular waves
- To demonstrate concepts such as the integral of $kf(x)$ is equal to k times the integral of $f(x)$ when k is a constant
- To graph the normal probability curve (the bell-shaped curve) and show that the area under the curve between -1 and 1 is .68, thus showing that approximately 68 percent of a "normal" population lies within one standard deviation of the mean

Although most of the concepts I have mentioned are formally proven in class, I have found that the visual demonstrations I can make with the program help my students focus on the task at hand.

RUNNING THE PROGRAM

Run the program after loading it. You will be presented with the title page. Note that all text is on the high resolution graphics screen (`PMODE 4`). You will then be asked if you want instructions. The instructions are rather lengthy and comprehensive, but I feel the program is easy enough to use that you will only need to read them once. Go through the instructions now and then return to this article, or skip the instructions for the time being and continue reading.

You will then be presented with the main menu. You have three options: 1) Graph one equation; 2) Graph two equations simultaneously; and 3) Use new equations. Let's graph the cubic equation $y=x^3-8x+5$. Enter Option 3 at the menu. The screen will then show the instructions for writing an equation. Write the equation at Line 10 in the form $y=f(x)$. If you were graphing two equations, you would write the second equation at Line 20.

At Line 10, type `10 Y=Y↑3-8*X+5`. Then type `RUN5` and press ENTER. You will be returned immediately to the main menu. Choose 1 at the main menu to draw the graph of one equation. You will then be asked for the x-interval over which you want the graph displayed. Let's graph the equation from $x=-10$ to $x=10$. Enter `-10` for the minimum value of x and `10` for the maximum value of x. After about 15 seconds, the graph of the equation at Line 10 is displayed on the screen. At the bottom of the screen, you will see the prompt:

```
<D><V><R><S><A><M> <H>ELP
```

The program is asking what you want to do next. D, V, R, etc., are mnemonic devices to help you remember what the program can do (i.e., enter `D` to change the domain, `R` to find the roots, `A` to find the area below the curve, etc.). But if you forget what they stand for, enter `H` for help and you will be presented with a help screen. Do so now. Then press ENTER to return to the graph. Except for the help screen, the graph will remain on the screen while all calculations are performed.

Changing the Domain (the X-Interval)

Since most of the action on the graph of this equation seems to be taking place between $x=-4$ and $x=4$, let us "explode" the graph. Enter `D` to change the domain, then enter `-4` and `4` for the minimum and maximum values of x. After a few seconds, the exploded graph is drawn on the screen. You can continue exploding the graph if you so desire.

Evaluating the Function (Finding the Y-Coordinates)

Let's find the value of the function when $x=3.5$. Enter `V` for value and then enter `3.5` for x. The screen shows that $y=19.88$ when $x=3.5$. Notice also that there is a blinking dot on the graph at point 3.5, 19.88. Press ENTER to return to the prompt. Let us find a few more values of the function. Enter `V` again and then enter `-1.8` for x. The screen should show $y=13.57$. Try a few more values. Remember to press ENTER to return to the prompt after the computer has performed a calculation.

Finding the Roots of the Function

The roots of the equation occur where the graph crosses the x-axis. We can see from the graph that this equation has three roots; near $x=-3$, $x=1$ and $x=2.5$. The program uses the Newton-Rhapson method to converge on the roots. Enter `R` for root. You must then enter an initial estimate of the root, which you can get by looking at the graph. Since you can see from the graph that a root lies somewhere between -4 and -2, enter `-3` for the estimate. After a couple of seconds, the screen tells you that there is a root at $x=-3.1$. Also notice the blinking dot where the root occurs. Press ENTER to return to the prompt. Find the other roots. Enter `R` again.

The second root appears to be around $x=1$. Enter `1` for an estimate. The screen tells you that the root is $x=.661$. Press ENTER and `R` again to find the third root. Enter `3` for an estimate. The root is at $x=2.439$. The estimates do not have to be too exact. Try repeating the procedure and entering `4` for an estimate. Again the screen shows that $x=2.439$ is a root. The closer your estimate is to the actual root, the quicker the program will converge on the root. Try entering `1000` for an estimate. It will still converge on 2.439, but it will take longer.

Finding the Slope of the Graph (Evaluating the First Derivative)

Enter `S` at the prompt to find the slope of the graph. The program will find a good numerical approximation to the value of the derivative of the function at any point. Actually, it will find the slope of the secant line between two very close points; but in many cases, after rounding, the value given will be exactly that of the slope of the tangent to the curve. Let's find the slope at $x=4$. Enter `4` for x. The screen shows 39.99. Note the exact value is 40. Also note the slope is positive, and the graph is rising at $x=4$. Repeat the process for a few more values.

Area Under a Curve — The Definite Integral

Let's find the area under the curve from $x=-2$ to 0. Enter `A` for area. You will be asked for the limits of integration. Enter `-2` for the minimum value of x and `0` for the maximum value. The program partitions the interval into 200 subintervals and uses Simpson's rule to find the area. Note that the region in question is shaded in while the computations are in progress. After a few seconds, the screen shows the area is 22 square units.

Graphing Two Equations

Let's now graph two equations on the axes. We will graph the present equation at Line 10 and its derivative at Line 20. The derivative of $y=x^3-8x+5$ is $3x^2-8$. Enter `M` at the prompt to return to the main menu and then choose Option 3 to write a new equation. Since we want to keep the present equation at Line 10,

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type `20 Y=3*X↑2-8` and press ENTER. Then type `RUN5` to return to the main menu and choose Option 2 (graph two equations). Enter `-5` for the minimum value of x and `5` for the maximum value. After about 30 seconds, both graphs are displayed on the screen. Note this time the prompt at the bottom of the screen includes <I> to find the intersection of the two graphs.

You can evaluate either function, find the roots of either function, find the slope of either function, and find the area between the two curves. Also note the relationship between the graph of Equation 1 (at Line 10) and the graph of its derivative at Line 20. When the graph Equation 2 lies above the x-axis (the derivative is positive), the graph of Equation 1 is rising (it has positive slope). When the graph of the derivative is below the x-axis, the graph of equation 1 is falling. And when the graph of Equation 2 crosses the x-axis (the derivative is zero), the graph of Equation 1 has a turning point (a relative maximum or minimum.

Finding the Relative Maximum and Minimum Values of a Function

Let's find the relative maximum and minimum values of Equation 1 ($y=x^3-8x+5$. First we must find the points where its derivative is zero (i.e., the roots of Equation 2). Enter `R` for roots and then enter `2` to specify that you want the roots of Equation 2. The graph of the derivative seems to be crossing the x-axis somewhere around $x=-2$. Enter `-2` for an estimate. The screen then shows that there is a root at $x=-1.633$. Press ENTER to return to the prompt.

Now we must find the value of Equation 1 at $x=-1.633$. Enter `V` for value and then `1` to specify Equation 1. Then enter `-1.633` for x. The screen shows $y=13.71$. Thus, 13.71 is a relative maximum value of the function, and (-1.633, 13.71) are the coordinates of the relative maximum of Equation 1.

Now let's find the coordinates of the other turning point of Equation 1 (the relative minimum). The graph of the derivative crosses the x-axis around $x=2$. Enter `R` for root and `2` to specify Equation 2. Then enter `2` for the estimate. The screen shows a root at $x=1.633$. Return to the prompt and then evalutate Equation 1 at $x=1.633$. The screen shows $y=-3.709$. Thus, the relative minimum value of the function is -3.709, and the graph of Equation 1 has a turning point at (1.633, -3.709).

Finding the Intersection of Two Graphs

Let's find the intersection of the two graphs. Note the graphs intersect at three different points. After returning to the prompt, enter `I` for intersection. Again you will be asked for an estimated value of x. Since the graphs intersect around $x=-2.5$, enter `-2.5`. The screen shows that the graphs intersect at (-2.445, 9.94). Return to the prompt and find the other two intersections by entering an appropriate estimate for x. The other two intersections occur at (1.275, -3.126) and (4.171, 44.19).

Finding the Area Between Two Curves

Let's find the area bounded by the two curves between $x=-3$ and $x=2$. Enter `A` for area and then enter `-3` and `2` for the limits of integration. The screen shows the area is approximately 47.86 square units.

INVESTIGATIONS

Here are some of the many investigations I have carried out with my students using this program.

The Derivative of Sin X

Before giving a formal proof that the derivative of sin$x$ is cos$x$, I have my students graph the equations $y=\sin x$ at Line 10 and $y=\cos x$ at Line 20 in the interval from 0 to 6.28 (twice pi radians). Then I ask them to find the slop of $y=\sin x$ and the value of $y=\cos x$ fo various values of x. The students quickly conclude that the slope of $y=\sin x$ is the same as the value of $y=\cos x$ for any value of x and, therefore, the derivative of sin$x$ must be cos$x$.

Now I proceed with the formal proof. But I find now, since the students know what the outcome should be, they are more focused on what I'm doing as I go through the formal proof. During the process of the proof, one must show the limit as x approaches 0 of $(\sin x)/x=1$. No problem. Graph $y=(\sin x)/x$ from $x=-3.14$ to 3.14 (see below for graphing discontinuous functions) and show the graph approaches 1 as x approaches 0 from either side. (A formal proof of this important limit also follows.) A similar process can show the derivative of cos$x$ is -sin$x$, the derivative of e^x is e^x, and the derivative of LOGx is $1/x$. Note when using trigonometric functions, the value of x must always be specified in radians, not degrees.

Trigometric Identities

To show that $\sin 2x=2\sin x\cos x$, graph $y=\sin 2x$ at Line 10 and $y=2\sin x\cos x$ at Line 20 over the interval from 0 to 6.28. After Equation 1 has been graphed, the students will see the second graph coincides exactly with the first graph that is already onscreen. One can also use `V` for value to evaluate both equations 1 and 2 for various values of x. They will be equal. Try this for other identities.

Taylor Series Expansions

The function $y=\sin x$ can be approximated by the Taylor series: $x-x^3/3!+x^5/5!-x^7/7!+\ldots$ where 3! means 3X2X1 or 6, and 5! means 5X4X3X2X1 or 120. The approximation becomes better as more terms are used. To demonstrate this, graph $y=\sin x$ at Line 10 and $y=x-x^3/6$ at Line 20 in the interval from -3.14 to 3.14. Note the graphs seems to coincide for $-1<x<1$. Try evaluating both functions for various values of x within this interval and compare the results. Then add more terms of the expansion to Line 20. You will see the graphs will coincide over larger intervals as more terms are added. Similar demonstrations can be done with the expansions for cos$x$ and e^x.

Piecewise and Discontinuous Functions

To graph a piecewise function, such as:

$y=x^2$ for $x<2$
$y=2x$ for $2<=x<3$
$y=-x+9$ for $x>=3$

type at Line 10: `10 IF X<2 THEN Y = X↑2 ELSE IF X>=2 AND X<3 THEN Y=2*X ELSE Y=-X+9`. Try graphing the function from $x=0$ to 4.

You can use a similar technique to graph discontinuous functions. For example, the function $y=1/(x-2)$ is undefined at $x=2$. Graphing this function over an interval containing $x=2$ may result in a division by zero error. To avoid this, and also avoid a very large range in the y values, type at Line 10: `10 IF X<=1.9 OR X>=2.1. THEN Y=1/(X-2) ELSE Y=0`. Then graph the function from $x=0$ to 4. (As an alternative, you could type: `10 IF ABS(X-2) >= .1 THEN Y=1/(X-2) ELSE Y=0`). Although y does not equal zero for values of x between 1.9 and 2.1, these points will be plotted on the x-axis and will not be visible. Note that to do this, you must understand the proper use of the `OR`, `AND` and `ELSE` statements.

POSSIBLE ERRORS

I have used the program extensively during the past year and, hopefully, it is fully debugged. However, errors may arise due to the equations you write at lines 10 and 20. There are five possible errors:

SN Error (Syntax Error) at lines 10 or 20 — You did not use the proper BASIC syntax when you wrote the equation. For example, you might have typed `SIN(2X)` instead of `SIN(2*X)`. Check your BASIC manual for the proper syntax.

/0 Error (Division By Zero Error) at lines 10 or 20 — Your equation is undefined for a value of x over the interval you have chosen. See above for graphing discontinuous functions.

FC Error (Function Call Error) at lines 10 or 20 — This can arise when you try to graph functions such as `SQR` and `LOG` over intervals for which the argument is negative. For example `SQR(X-2)` is not a real number for values of x less than 2. Use a different x interval.

OV Error (Overflow Error) at lines 10 or 20 — The value of the function over the interval you have specified is greater than the computer's capacity. For example, graphing $y=x^{10}$ from x=5000 to 10000 will result in an Overflow Error.

OS Error (Out Of String Space Error) — When running the program for the first time immediately after loading it, you cannot type `RUN5`. You must run the program from the beginning, because Line 1 in the program clears the necessary string space. If this error occurs, either run the program from the beginning or type `CLEAR 1000` and then type `RUN5`.

CONCLUSION

As I mentioned at the beginning, this program has proven to be very valuable in my calculus class. It has made many of the concepts and activities involved in the course much more meaningful to the students. I keep a Color Computer at the front of my room and load this program at the beginning of each class, since it often comes in handy in situations I do not anticipate.

The computer has become an extension of my blackboard. I hope other high school teachers of advanced mathematics (including calculus, precalculus, math analysis, trigonometry and algebra) will also find it useful. If you come up with some interesting ways of using the program in your classroom, I would appreciate hearing about it.

BONUS PROGRAM

Equation is a drill-and-practice program for solving first-degree algebraic equations. It may be used either in a prealgebra class or in an introductory algebra course. Each lesson consists of 10 randomly generated equations.

There are three levels of difficulty the student may choose. Level 1 consists of equations that can be solved in one step, such as:

$$-3x=18$$

or

$$x+4=-12$$

Level 2 involves equations that require two or more steps for a solution, such as:

$$5x-4=-24$$

or equations that require the use of the distributive property, such as:

$$-3(x-2)=15$$

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Level 3 consists of equations that have the variable on both sides, such as:

$$3x-4=-5x+28$$

The student may also choose Level 4, a mixture of all three levels, if he desires.

The student is given two chances to solve the equation correctly. He receives 10 points (and a graphic reward) for solving the equation correctly on the first try, but only 5 points on the second try. If he is still not successful after two attempts, he is shown not only the answer, but a detailed, step-by-step solution.

The student may try as many sets of 10 problems as he desires. At the end of each set, he is given his score for the current lesson, along with his cumulative score including the previous lessons. If he scores less than 75 percent, he is encouraged to practice some more.

I have used the program with slow learners in a pre-algebra class, and I found it very effective not only in reinforcing the axioms of equality, but also operations with signed numbers. The program is rather lengthy, and due to space limitations the listing will not be printed; however, the program will be included on this month's RAINBOW ON TAPE and RAINBOW ON DISK.

(Questions or comments may be addressed to Mr. Toscano at Box 2400, Vineyard Haven, MA 02568. Please enclose an SASE when requesting a reply.) □

Editor's Note: The bonus drill and practice program, `EQUATION`, *will immediately follow* `GRAPH` *on this month's RAINBOW ON TAPE and RAINBOW ON DISK.*

44	132	5460	10	10143	117
67	1	5920	150	20105	235
86	195	7280	94	20118	200
1600	9	7450	20	20210	169
2740	130	7562	243	20235	223
3600	174	7660	41	20290	13
4100	84	7842	148	20340	100
4660	100	9130	197	20420	243
5080	108	9340	95	END	148

The listing: `GRAPH`

```
1 CLEAR1000:CLS
2 FLAG=1:PMODE4,1:PCLS:SCREEN1,0
5 CLS:DIM K$(100),E1(192),E2(192
),A(4,4):C$="COMPUTATIONS ARE IN
 PROGRESS...":GOTO32
10 Y=SIN(X)
12 RETURN
20 Y=COS(X)
22 RETURN
32 K$(32)="BR8":'SPACE
33 K$(33)="BR3UBU2U3BD6BR4":'!
34 K$(34)="BRBU3EU2BR3D2GBD3BR4"
:'"
35 K$(35)="BRBUR5BU3L5BED5BR3U5B
D5BR2":'#
36 K$(36)="BRBUFR3EUHL3HUER3FBHB
L2NUD7BU2BR5":'$
37 K$(37)="BRBU4EFGHBR5G5BR4HEFG
BR3":'%
39 K$(39)="BR3BU3EU2BR4BD6":'APO
ST
40 K$(40)="BR4H2U2E2BD6BR4":'(
41 K$(41)="BR4BU6F2D2G2BR4":')
42 K$(42)="BR2BU2E2NH2NU2NE2NF2D
2BD2BR4":'*
43 K$(43)="BR2BU3R2NU2NR2D2BDBR4
":'+
44 K$(44)="BR3EUBD2BR4":',
45 K$(45)="BR2BU3R4BD3BR2":'-
46 K$(46)="BR2R1BR4":'.
47 K$(47)="BRE5BD5BR2":'/
48 K$(48)="BR2HU4ER3FD4GNL3BR3":
'0
49 K$(49)="BR3R2BLU6GBD5BR5":'1
50 K$(50)="BRBU5ER3FG4DR4BR3":'2
51 K$(51)="BRBU5ER3FG2F2G1L3HBFB
R6":'3
52 K$(52)="BR5U6G4R5BD2BR2":'4
53 K$(53)="BRBUFR3EU2HL4U2R5BD6B
R2":'5
54 K$(54)="BRBUNUFR3EUHL3GU3ER3B
D6BR3":'6
55 K$(55)="BRBU6R5G5DBR7":'7
56 K$(56)="BR2HUEHUER3FDGNL3FDGL
3BR6":'8
57 K$(57)="BR2BU3HUER3FD2NL3D2GL
3BR6":'9
58 K$(58)="BR4BUUBU2UBD5BR4":':
59 K$(59)="BR3EUBU2UBD5BR4":';
60 K$(60)="BR2BU3NE3F3BR3":'<
61 K$(61)="BRBU4R4BD2L4BD2BR7":'
=
62 K$(62)="BR2BU6F3G3BR6":'>
63 K$(63)="BR2BU5ER2FG2BD2DBR4":
'?
65 K$(65)="BRU5ER3FD3NL5D2BR2":'
A
66 K$(66)="BRU6R4FDGNL4FDGNL4BR3
":'B
67 K$(67)="BR2HU4ER3FBD4GNL3BR3"
:'C
68 K$(68)="BRU6R3F2D2G2NL3BR4":'
D
69 K$(69)="BRNR5U3NR3U3R5BD6BR2"
:'E
70 K$(70)="BRU3NR3U3R5BD6BR2":'F
71 K$(71)="BR2HU4ER3FBD2NL2D2GNL
3BR3":'G
72 K$(72)="BRU3NU3R5NU3D3BR2":'H
73 K$(73)="BR4NLNRU6NLNRBD6BR4":
'I
74 K$(74)="BR2NHR3EU5NLRBD6BR":'
J
75 K$(75)="BR2U2NU4ENE3F3BR2":'K
```

```
76 K$(76)="BRNU6R5BR2":'L
77 K$(77)="BRU6F2RE2D6BR2":'M
78 K$(78)="BRU6F5NU5DBR2":'N
79 K$(79)="BR2HU4ER3FD4GNL3BR3":
'O
80 K$(80)="BRU6R4FDGL4BD3BR7":'P
81 K$(81)="BR3H2U2E2RF2D2GNHNFGL
BR5":'Q
82 K$(82)="BRU5ER3FDGL2NL2F3BR2"
:'R
83 K$(83)="BRBUFR3EUHL3HUER3FBD5
BR2":'S
84 K$(84)="BR4U6NL2R2BD6BR2":'T
85 K$(85)="BRBU6D5FR3EU5BD6BR2":
'U
86 K$(86)="BRBU6D3F3E2U4BD6BR2":
'V
87 K$(87)="BRNU6E2RF2NU6BR2":'W
88 K$(88)="BRUE2H2UBR5DG2NLF2DBR
2":'X
89 K$(89)="BRBU6F3ND3E2UBD6BR2":
'Y
90 K$(90)="BRBU6R5DG4DR5BR2":'Z
94 K$(94)="BR2BU4E2F2BD4BR2":'^
95 IF FLAG=0 GOTO5820 ELSE GOTO
5600
1000 '**PRINT ON HIRES SCREEN
1100 P=ZP:GOSUB1240
1120 ZF$="S"+STR$(ZF)+"BM"+STR$(
ZX)+","+STR$(ZY):DRAW ZF$
1140 FOR ZJ=1 TO LEN(ZM$)
1160 ZK=ASC(MID$(ZM$,ZJ,1))
1180 DRAW K$(ZK):P=P+1:IF INT(P/
32)=P/32 THEN ZX=0:ZY=ZY+12:ZF$=
"BM"+STR$(ZX)+","+STR$(ZY):DRAW
ZF$
1200 NEXT ZJ:RETURN
1240 '**CONVERT PRINT@ TO HIRES
COORD
1340 ZX=(P-INT(P/32)*32)*8:ZY=IN
T(P/32)*12+8:RETURN
1400 '**HI RES TEXT INPUT
1560 GOSUB1000:'PROMPT
1580 GOSUB1240:'FIND COORD FOR I
NPUT
1600 ZZ$=INKEY$:ZZ$="":ZA$=""
1620 ZZ$=INKEY$:IF ZZ$<>""THEN17
00
1660 LINE(ZX,ZY-7)-(ZX+6,ZY),PSE
T,BF
1680 COLOR 1,0:LINE(ZX,ZY-7)-(ZX
+6,ZY),PSET,BF:COLOR 0,1:GOTO162
0
1700 IFZZ$>CHR$(13)THEN1760
1720 IFZZ$=CHR$(13)ANDLEN(ZA$)<>
0THEN1900
1740 IFZZ$=CHR$(8)THEN1840
```

Now Create Your Own Signs, Banners, and Greeting Cards.

Introducing The Coco Graphics Designer

Last Christmas we introduced our COCO Greeting Card Designer program (see review April 86 Rainbow). It has been so popular that we've now expanded it into a new program called the COCO Graphics Designer. The Coco Graphics Designer produces greeting cards plus banners and signs. This program will further increase the usefullness and enjoyment of your dot matrix printer.

The Coco Graphics Designer allows you to mix text and pictures in all your creations. The program features picture, border, and character font editors, so that you can modify or expand the already built in libraries. Plus a special "grabber" utility is included to capture areas of high resolution screens for your picture library.

Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1,ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, NX-10, C-Itoh 8510, DMP-100/ 130/ 400/ 430, Seikosha GP-100/250, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers.
#C332 Coco Graphics Designer $29.95

Over 100 More Pictures

An optional supplementary library diskette containing over one hundred additional pictures is available.
#C333 Picture Disk #1 $14.95.

Colored Paper Packs

Now available are packs containing 120 sheets of tractor-feed paper and 42 matching envelopes in assorted bright RED, GREEN, and BLUE. Perfect for making your productions unforgettable.
#C274 Paper Pack $19.95

GARAGE SALE
SAT & SUN APRIL 12-13 34 HILLTOP LANE GREENLAWN
COMPUTER FAIR JULY 24
GET YOUR TICKETS TODAY!
DANGER
DO NOT ENTER
MOON UNIT CALLING THIN MUFFIN
COME IN...
HAPPY
LETS GO SAILING

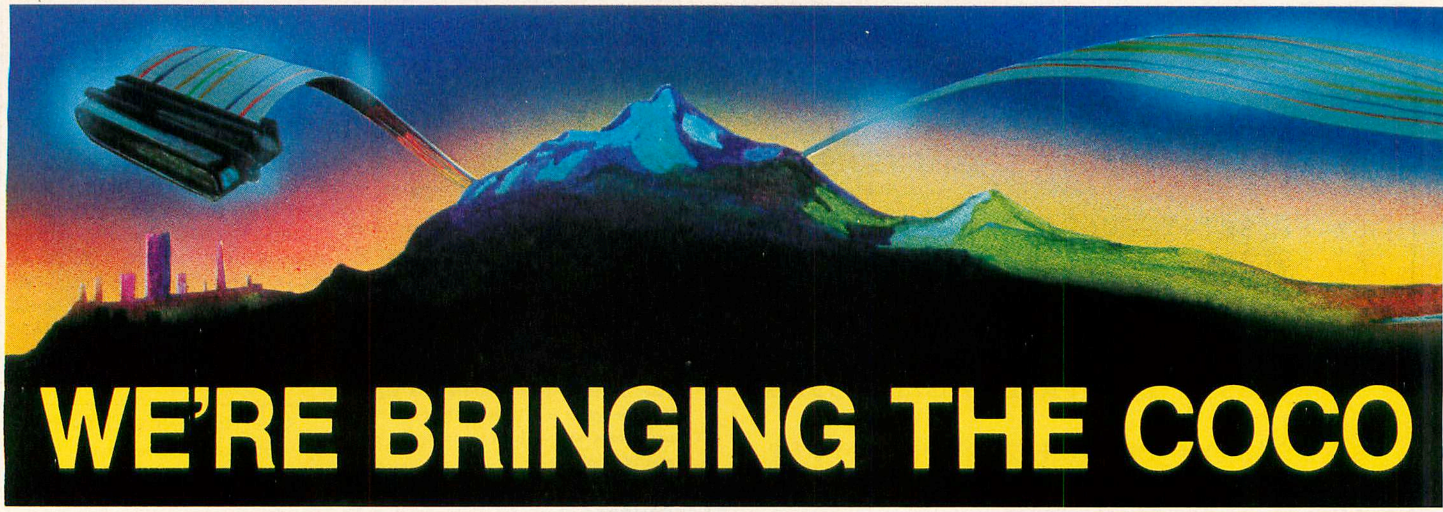
With Zebra's Coco Graphics Designer it's easy and enjoyable making your own greeting cards, signs, and banners.

NEWS FLASH!
CGP-220 and DMP-105
NOW SUPPORTED

As of June 1, 1987 we are shipping version 2.3 of the CoCo Graphics Designer. This version includes drivers for the CGP-220 and DMP-105 printers, and improved menu dialogs for single disk drive users. By the time this issue appears in print we will probably also have added Okidata printer drivers - check with us if you have an Okidata.

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD add $3.00. VISA/MC Accepted. NY residents add sales tax.

Zebra Sytems, Inc
78-06 Jamaica Ave.
Woodhaven, NY 11421
(718) 296-2385



RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our $31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:

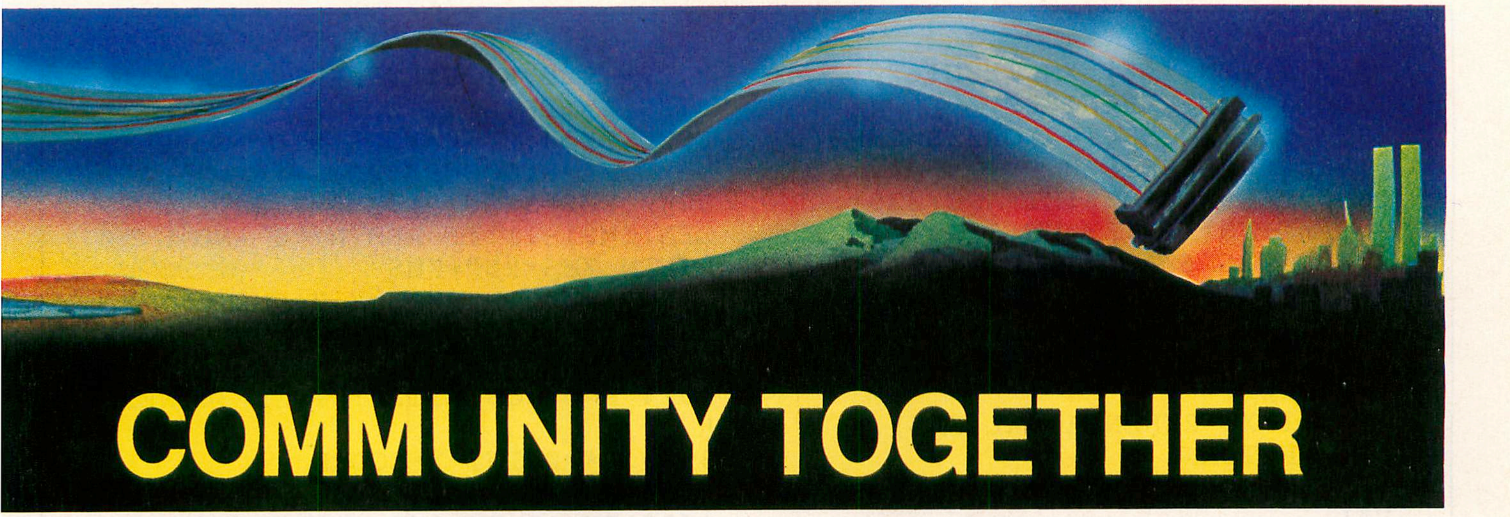
(800) 544-4005

(617) 491-3393

DELPHI

TYPE:

GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

On Telenet: Call (800) 821-5340 to get the Telenet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type `GVC` (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $10.80 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

```
1760 IFLEN(ZA$)=XM THEN1620
1780 IFXT<>2THEN1820
1800 IFZZ$<CHR$(43)ORZZ$>CHR$(57
)THEN1620ELSE1820
1820 ZA$=ZA$+ZZ$:ZI=ASC(ZZ$):DRA
W"BL6"+K$(ZI):ZX=ZX+8:GOTO1620
1840 IFLEN(ZA$)<1THEN1620
1860 ZA$=LEFT$(ZA$,LEN(ZA$)-1)
1880 ZX=ZX-8:COLOR1,0:LINE(ZX,ZY
-7)-(ZX+8,ZY),PSET,BF:COLOR0,1:G
OTO1620
1900 IFXT=2THENZA=VAL(ZA$)
1920 RETURN
2700 '** FIND MAX MIN OVER INTER
VAL
2740 POKE65495,0:D=(R-L)/192:YU=
-1E+16:YL=1E+16:X=L:FORK=0TO192:
X=L+K*D:IFEQ=1THENGOSUB10:E1(K)=
Y:GOTO2840
2820 GOSUB20:E2(K)=Y
2840 IFY<YL THENYL=Y:XL=X
2860 IFY>YU THENYU=Y:XU=X
2880 NEXTK
2900 X=R:IFEQ=1THENGOSUB10ELSEGO
SUB20
2920 IFEQ=1THENE1(192)=Y ELSEE2(
192)=Y
2940 IFY<YL THENYL=Y:XL=X
2960 IFY>YU THENYU=Y:XU=X
2970 IFYL>0THENYL=0
2975 IFYU<0THENYU=0
2980 POKE65494,0:RETURN
3020 '**DRAW GRAPH
3080 '**DRAW BORDERS
3120 PMODE4,1:COLOR0,1:PCLS:SCRE
EN1,1:POKE178,2:LINE(63,1)-(255,
145),PSET,B
3180 '**HORIZONTAL GRIDS
3220 FORY=1TO145STEP36:LINE(64,Y
)-(255,Y),PSET:NEXTY
3320 '**VERTICAL GRIDS
3360 FORX=63TO255STEP96:LINE(X,1
)-(X,7),PSET:LINE(X,139)-(X,151)
,PSET:NEXTX:FORX=111TO207STEP96:
LINE(X,1)-(X,7),PSET:LINE(X,139)
-(X,164),PSET:NEXTX:POKE178,0
3540 '**Y-AXIS
3580 IFSGN(L)=SGN(R)THEN3700
3600 X=63-L/(R-L)*192:X=INT(X):F
ORK=X-1TOX+1:IFK>255THEN3660
3610 LINE(K,0)-(K,145),PSET:NEXT
K
3660 '**X-AXIS
3700 AX=0:IF SGN(YU)=SGN(YL) THE
N 3780
3720 Y=145+YL/(YU-YL)*145+1:Y=IN
T(Y):AX=Y:FORK=Y-1 TO Y+1:LINE(6
3,K)-(255,K),PSET:NEXTK
3780 '**PRINT Y-COORD
3820 ZX=0:ZY=8:FORK=0TO4:N=YU-(Y
U-YL)/4*K:GOSUB5320
3860 ZM$=STR$(N):ZM$=RIGHT$(ZM$,
LEN(ZM$)-1):IF ABS(N)<1 AND N<>0
 THEN ZM$="0"+ZM$
3880 IFN<0THENZM$="-"+ZM$
3900 IFLEN(ZM$)<7THENZM$=" "+ZM$
:GOTO3900
3924 P=0:GOSUB1120:ZY=ZY+34:NEXT
K
3960 '**PRINT X-COORD
4000 N=L:GOSUB4240
4020 ZX=42:ZY=163:GOSUB1120
4040 N=L+(R-L)/2:P=0:GOSUB4240
4060 ZX=140:ZY=163:GOSUB1120
4080 N=L+(R-L):GOSUB5320:ZM$=STR
$(N):ZM$=RIGHT$(ZM$,LEN(ZM$)-1)
4100 IF ABS(N)<1 AND N<>0 THEN Z
M$="0"+ZM$
4120 IF N<0 THEN ZM$="-"+ZM$
4140 IF LEN(ZM$)<6 THEN ZM$=" "+
ZM$:GOTO4140
4160 ZX=210:ZY=163:GOSUB1120
4180 N=L+(R-L)/4:GOSUB4240
4200 ZX=92:ZY=175:GOSUB1120
4220 N=L+(R-L)/4*3:GOSUB4240:ZX=
188:ZY=175:GOSUB1120:GOTO4420
4240 GOSUB5320:ZM$=STR$(N):ZM$=R
IGHT$(ZM$,LEN(ZM$)-1)
4260 IFABS(N)<1ANDN<>0THENZM$="0
"+ZM$
4280 IFN<0THENZM$="-"+ZM$
4300 IFLEN(ZM$)<6THENZM$=ZM$+" "
4320 IFLEN(ZM$)<6THENZM$=" "+ZM$
:GOTO4300
4340 RETURN
4380 '**PLOT GRAPH
4420 IFM=2THENZM$="GRAPH OF EQUA
TION"+STR$(EQ):ZP=480:GOSUB1000
4480 X1=63:FORK=0TO192:IFEQ=1THE
NY=E1(K):POKE178,1:ELSEY=E2(K):P
OKE178,2
4485 IF Y=0 THEN POKE 178,0
4500 Y1=145*(Y-YU)/(YL-YU)+1:IFY
1<0THENY1=0
4510 LINE(X1,Y1)-(X1-1,Y1-1),PSE
T,BF
4520 X1=X1+1:NEXTK:RETURN
4650 '**ENTER X-INTERVAL
4660 GOSUB4780:ZM$="MINIMUM VALU
E OF X? ":XM=8:XT=2:GOSUB1400:L=
ZA:GOSUB4780:ZM$="MAXIMUM VALUE
OF X? ":GOSUB1400:R=ZA:IFABS(R-L
)<.001THENGOSUB4780:ZM$="INTERVA
L MUST BE > .001":ZP=480:GOSUB10
```

```
00:ZT=2:GOSUB4900:GOTO4660
4670 IFR<L THENTEMP=L:L=R:R=TEMP
:RETURN
4700 '**CLEAR TO END OF SCREEN
4710 POKE65495,0:P=ZP:GOSUB1240:
COLOR1,0:LINE(ZX,ZY-8)-(255,191)
,PSET,BF:COLOR0,1:POKE65494,0:RE
TURN
4740 '**PRINT CENTERED
4750 ZP=32*(ZL-1)+16-LEN(ZM$)/2:
GOSUB1000:RETURN
4780 '**CLEAR PROMPT LINE
4820 COLOR1,0:LINE(0,180)-(255,1
91),PSET,BF:COLOR0,1:RETURN
4900 '**TIME DELAY
4940 TIMER=0
4960 IF TIMER<ZT*60THEN4960
4980 RETURN
5020 '**ENTER KEY S/R
5060 ZM$="PRESS THE ENTER KEY TO
 CONTINUE.":ZP=480:GOSUB1000
5080 ZZ$=INKEY$:IFZZ$=""THEN5080
ELSEIFZZ$<>CHR$(13)THEN5080
5100 RETURN
5140 '**ALTERNATE ENTER KEY S/R
5160 XX=0:X1=INT(X1):Y1=INT(Y1):
IFX1<63ORX1>255ORY1<0ORY1>146THE
NXX=1
5162 ZM$="ENTER":ZP=507:GOSUB100
0
5163 IFXX=1THEN5180
5165 X2=X1-2:IFX2<63THENX2=63
5167 X3=X1+2:IFX3>255THENX3=255
5169 Y2=Y1-2:IFY2<0THENY2=0
5171 Y3=Y1+2:IFY3>146THENY3=146
5173 GET (X2,Y2)-(X3,Y3),A
5180 ZZ$=INKEY$:IFZZ$=CHR$(13)TH
EN5200
5185 IFXX=1THEN5180
5190 CIRCLE(X1,Y1),2,0:ZT=.5:GOS
UB4900:CIRCLE(X1,Y1),2,1:ZT=.5:G
OSUB4900:GOTO5180
5200 IFXX=1THEN5220
5210 PUT (X2,Y2)-(X3,Y3),A
5220 GOSUB4780:RETURN
5320 '**ROUND OFF S/R
5360 IFABS(N)>=1000000THEN5460
5380 IFABS(N)>=1000ANDABS(N)<100
0000THENN=INT(N+.5):GOTO5460
5400 IFABS(N)>=100ANDABS(N)<1000
THENN=INT(N*10+.5)/10:GOTO5460
5420 IFABS(N)>=10ANDABS(N)<100TH
ENN=INT(N*100+.5)/100:GOTO5460
5440 IFABS(N)<10THENN=INT(N*1000
+.5)/1000:GOTO5460
5460 RETURN
5500 '***** MAIN PROGRAM *****
5560 '**OPENING PAGE
5600 ZM$="GRAPHS AND ROOTS":ZF=8
:ZP=64:GOSUB1000
5620 ZM$="  OF FUNCTIONS  ":ZP=1
28:GOSUB1000:ZF=4
5640 ZM$="BY LOUIS R. TOSCANO":Z
L=8:GOSUB4740
5660 ZM$="P.O. BOX 2400":ZL=10:G
OSUB4740
5680 ZM$="VINEYARD HAVEN, MA 025
68":ZL=12:GOSUB4740
5700 ZM$="TEL: (617)-693-1328":Z
L=13:GOSUB4740
5720 ZM$="COPYRIGHT 1984":ZL=15:
GOSUB4740:ZT=4:GOSUB4900
5730 COLOR0,1:PCLS:ZM$="DO YOU W
ANT INSTRUCTIONS (Y/N)?":ZP=256:
XT=1:XM=1:GOSUB1400
5740 IF ZA$="Y"THEN GOSUB20000
5780 '**MENU AND DRIVER
5820 CLS:PRINT@4,"WHAT DO YOU WI
SH TO DO?"
5840 PRINT@64,"(1) DRAW THE GRAP
H OF THE           PRESENT EQUAT
ION AT LINE 10";
5860 PRINT@160,"(2) DRAW THE GRA
PH OF THE           PRESENT EQUA
TIONS AT LINES      10 AND 20 SI
MULTANEOUSLY"
5920 PRINT@288,"(3) WRITE NEW EQ
UATIONS AT LINES    10 AND/OR 20
"
5940 PRINT@392,"CHOOSE 1 - 3: ";
5942 LINEINPUT MENU$:M=VAL(MENU$
)
5945 IF M<>1 AND M<>2 AND M<>3 T
HEN PRINT@384,STRING$(32,32);:GO
TO5940
6020 PCLS:ON M GOSUB 7060,7060,3
0000
6040 CLS:GOTO5820
7020 '**GRAPH OF TWO EQUATIONS
7060 PMODE 4,1:COLOR0,1:PCLS:SCR
EEN 1,0
7160 ZP=0:ZM$="CHOOSE THE DOMAIN
 (X-INTERVAL)":GOSUB1000
7180 ZM$="MINIMUM VALUE OF X? ":
ZP=64:XM=8:XT=2:GOSUB1400:L=ZA
7200 ZP=128:ZM$="MAXIMUM VALUE O
F X? ":GOSUB1400:R=ZA
7220 IF R<L THEN TEMP=L:L=R:R=TE
MP
7240 ZP=256:ZM$="COMPUTATIONS WI
LL TAKE ABOUT   "+STR$(15*M)+" S
ECONDS. PLEASE STAND BY.":GOSUB1
000
7260 EQ=1:GOSUB2700:IFM=1THEN734
```

```
0
7280 YL(1)=YL:YU(1)=YU:EQ=2:GOSU
B2700:YL(2)=YL:YU(2)=YU
7300 YL=YL(1):IF YL(2)<YL THEN Y
L=YL(2)
7320 YU=YU(1):IF YU(2)>YU THEN Y
U=YU(2)
7340 EQ=1:GOSUB3020:IFM=1THEN738
0
7360 GOSUB4780:EQ=2:GOSUB4380
7380 GOSUB4780:ZM$="<D><V><R><S>
<A>":IFM=2THENZM$=ZM$+"<I>
7382 ZM$=ZM$+"<M> <H>ELP ":ZP=48
0:XM=1:XT=1:GOSUB1400
7385 IF ZA$<>"D"ANDZA$<>"V"ANDZA
$<>"R"ANDZA$<>"S"ANDZA$<>"A"ANDZ
A$<>"I"ANDZA$<>"M"ANDZA$<>"H"THE
N7380
7387 IFM=1ANDZA$="I"THEN7380
7390 IF ZA$="D"THEN7400 ELSE IF
ZA$="V"THEN7450 ELSE IF ZA$="R"T
HEN7500 ELSE IF ZA$="H"THEN 7550
 ELSE IF ZA$="I" THEN 7600 ELSE
IF ZA$="A"THEN7650 ELSE IF ZA$="
S"THEN7800 ELSE RETURN
7400 GOSUB4650
7435 GOSUB4780:ZM$=C$:ZP=480:GOS
UB1000:GOTO7260
7450 IFM=1THEN7460
7452 GOSUB4780:ZM$="EQUATION (1)
 OR (2)? ":ZP=480:XT=2:XM=1:GOSU
B1400:EQ=ZA:IFEQ<>1ANDEQ<>2THEN7
452
7460 GOSUB4780:ZM$="X = ":ZP=480
:XM=8:XT=2:GOSUB1400:X=ZA:IF EQ=
1 THEN GOSUB10 ELSE GOSUB20
7465 N=Y:GOSUB5320:ZM$="Y = "+ST
R$(N):ZP=494:GOSUB1000:X1=63+(X-
L)/(R-L)*192:Y1=145*(Y-YU)/(YL-Y
U)+1:GOSUB5140:GOTO7380
7500 IFM=1THEN7510
7505 GOSUB4780:ZM$="EQUATION (1)
 OR (2)? ":ZP=480:XT=2:XM=1:GOSU
B1400:EQ=ZA:IFEQ<>1ANDEQ<>2THEN7
505
7510 GOSUB4780:ZM$="ENTER ESTIMA
TE. X = ":ZP=480:XT=2:XM=8:GOSUB
1400
7515 GOSUB4780:ZM$=C$:ZP=480:GOS
UB1000
7520 GOSUB9000:GOTO7380
7550 SCREEN 0,1:CLS
7555 PRINT@0,"<D>OMAIN - CHANGE
THE DOMAIN OF THE GRAPH(S)"
7557 PRINT@64,"<V>ALUE - FIND TH
E Y-COORDINATE OF THE GRAPH(S) F
OR A SPECIFIED VALUE  OF X"
7560 PRINT@160,"<R>OOTS - FIND T
HE ROOTS OF THE FUNCTION(S)"
7561 PRINT@224,"<S>LOPE - FIND T
HE SLOPE OF THE FUNCTION(S)"
7562 PRINT@288,"<A>REA - FIND TH
E AREA BETWEEN  THE CURVE AND X-
AXIS OR BETWEEN TWO CURVES"
7563 ZM$="<I>NTERSECTION - FIND
THE INTER-SECTION OF THE GRAPHS"
:IF M=2 THEN PRINT@384,ZM$
7564 IF M=1 THEN PRINT@384,"<M>E
NU - RETURN TO THE MENU" ELSE PR
INT@448,"<M>ENU - RETURN TO THE
MENU"
7570 PRINT@482,"PRESS <enter> TO
 CONTINUE";
7580 ZZ$=INKEY$:IF ZZ$<>CHR$(13)
 THEN 7580
7590 PMODE 4,1:SCREEN 1,1:GOTO73
80
7600 GOSUB4780:ZM$="ENTER ESTIMA
TE. X = ":ZP=480:XT=2:XM=8:GOSUB
1400
7610 GOSUB4780:ZM$=C$:ZP=480:GOS
UB1000:GOSUB9200
7620 GOTO7380
7650 GOSUB4780:ZM$="MINIMUM VALU
E OF X? ":ZP=480:XM=8:XT=2:GOSUB
1400:L1=ZA
7660 GOSUB4780:ZM$="MAXIMUM VALU
E OF X? ":ZP=480:GOSUB1400:R1=ZA
:IF ABS(R1-L1)<.001 THEN GOSUB47
80:ZM$="INTERVAL MUST BE > .001"
:ZP=480:GOSUB1000:ZT=2:GOSUB4900
:GOTO7650
7670 IF R1<L1 THEN TEMP=L1:L1=R1
:R1=TEMP
7680 IF L1<L OR R1>R THEN GOSUB4
780:ZM$="INTERVAL OUTSIDE DOMAIN
 OF GRAPH":GOSUB1000:ZT=2:GOSUB4
900:GOTO7650
7780 GOSUB4780:ZM$=C$:ZP=480:GOS
UB1000:IFM=1THENGOSUB10000ELSEGO
SUB12000
7790 N=AREA:GOSUB5320:GOSUB4780:
ZM$="AREA = "+STR$(N):GOSUB1000:
ZM$="ENTER":ZP=507:GOSUB1000
7795 ZZ$=INKEY$:IFZZ$<>CHR$(13)T
HEN7795ELSE7340
7800 IFM=1THEN7820
7810 GOSUB4780:ZM$="EQUATION (1)
 OR (2)? ":ZP=480:XM=1:XT=2:GOSU
B1400:EQ=ZA:IFEQ<>1ANDEQ<>2THEN7
810
7820 GOSUB4780:ZM$="X = ":ZP=480
:XM=8:XT=2:GOSUB1400:GOSUB4780
7830 X=ZA:H=X*(1E-6):IFH=0THENH=
1E-6
7835 IFEQ=1THENGOSUB10ELSEGOSUB2
0
7840 Y1=Y:X=H+X:IFEQ=1THENGOSUB1
0ELSEGOSUB20
7841 S1=Y/H-Y1/H
7842 X=ZA-H:IFEQ=1THENGOSUB10ELS
EGOSUB20
7844 S2=Y1/H-Y/H:N=(S1+S2)/2:GOS
UB5320:SLOPE=N
7860 ZM$="SLOPE = "+STR$(SLOPE):
GOSUB1000:ZM$="ENTER":ZP=507:GOS
UB1000
7870 ZZ$=INKEY$:IFZZ$<>CHR$(13)T
HEN7870ELSE7380
9000 '**FIND ROOT
9020 POKE65495,0:ROOT=ZA
9030 X=ROOT
9040 IF X=0 THEN X=.001
9050 FOR J=1 TO 50:IF EQ=1 THEN
GOSUB10 ELSE GOSUB20
9060 IF ABS(X)<.0001 AND ABS(Y)<
.0001 THEN 9160
9070 Y1=Y:X1=X:X=X+.000001*X
9080 IF EQ=1 THEN GOSUB10 ELSE G
OSUB20
9090 Y2=Y:IF Y2-Y1=0 THEN X=X+.0
001:GOTO9080
9100 SLOPE=(Y2-Y1)/(X-X1):X=X1:Y
=Y1
9110 ROOT=X-Y/SLOPE
9120 IF ABS((ROOT-X)/X)<.00005 T
HEN 9160
9130 X=ROOT:NEXT J
9140 GOSUB4780:ZM$="NO ROOT FOUN
D":IF MM=2 THEN ZM$=ZM$+" FOR EQ
UAT."+STR$(EQ)
9150 ZP=480:GOSUB1000:GOSUB5160:
GOTO9180
9160 IF ABS(ROOT) <.00001 THEN R
OOT=0
9170 GOSUB4780:N=ROOT:GOSUB5320:
ZM$="ROOT AT X = "+STR$(N):ZP=48
0:GOSUB1000:X1=63+(N-L)/(R-L)*19
2:Y1=145*(-YU)/(YL-YU)+1:GOSUB51
40
9180 POKE65494,0:RETURN
9200 '**FIND INTERSECTION
9220 POKE65495,0:ROOT=ZA:X=ROOT:
IF X=0 THEN X=.001
9230 FOR J=1 TO 75:GOSUB10:Y1=Y
9240 GOSUB20:Y1=Y1-Y
9250 X1=X:X=X+.0001*X
9260 GOSUB10:Y2=Y:GOSUB20:Y2=Y2-
Y
9270 IF ABS(X1)<.000001 AND ABS(
Y1)<.000001 THEN 9360
```

```
9280 IF Y2-Y1<>0 THEN 9310
9290 GOSUB10:Y1=Y:GOSUB20:Y2=Y:I
F ABS(Y2-Y1)<.00001 THEN 9360
9300 GOTO 9350
9310 SLOPE=(Y2-Y1)/(X-X1):X=X1:Y
=Y1
9320 ROOT=X-Y/SLOPE
9330 IF ABS((ROOT-X)/X)<.00005 T
HEN 9360
9340 X=ROOT:NEXT J
9350 GOSUB4780:ZM$="NO INTERSECT
ION FOUND.":ZP=480:GOSUB1000:514
0:POKE65494,0:RETURN
9360 IF ABS(ROOT)<.00001 THEN RO
OT=0
9370 X=ROOT:GOSUB10:IF ABS(Y)<.0
00001 THEN Y=0
9380 GOSUB4780:X1=63+(X-L)/(R-L)
*192:Y1=145*(Y-YU)/(YL-YU)+1:N=X
:GOSUB5320:ZM$="X="+STR$(N):N=Y:
GOSUB5320:ZM$=ZM$+"  Y="+STR$(N)
:ZP=480:GOSUB1000:GOSUB5140:POKE
65494,0:RETURN
10000 '**DEFINITE INTEGRAL
10100 POKE65495,0:AREA=0:DX=(R1-
L1)/200:X=L1:GOSUB10:X1=63+(X-L)
/(R-L)*192:AREA=AREA+Y
10110 Y1=145*(Y-YU)/(YL-YU)+1:IF
 AX<>0 THEN Y2=AX ELSE Y2=145
10115 LINE (X1,Y1)-(X1,Y2),PSET
10120 FOR ZK=1 TO 199:X=X+DX:GOS
UB10:X1=63+(X-L)/(R-L)*192
10140 IF INT(ZK/2)<>ZK/2 THEN AR
EA=AREA+4*Y ELSE AREA=AREA+2*Y
10142 Y1=145*(Y-YU)/(YL-YU)+1:IF
Y<0THEN POKE178,1 ELSE POKE 178,
2
10143 LINE(X1,Y1)-(X1,Y2),PSET
10150 NEXTZK
10160 X=R1:GOSUB10:X1=63+(X-L)/(
R-L)*192:AREA=AREA+Y
10170 Y1=145*(Y-YU)/(YL-YU)+1:LI
NE(X1,Y1)-(X1,Y2),PSET
10190 AREA=DX/3*AREA:RETURN
12000 '**AREA BETWEEN CURVES
12100 AREA=0:DX=(R1-L1)/200:X=L1
:GOSUB10:X1=63+(X-L)/(R-L)*192:Y
1=145*(Y-YU)/(YL-YU)+1:YTEMP=Y
12110 GOSUB20:Y2=145*(Y-YU)/(YL-
YU)+1:Y=ABS(YTEMP-Y):AREA=AREA+Y
12120 LINE(X1,Y1)-(X1,Y2),PSET
12130 FORZK=1TO199:X=X+DX:GOSUB1
0:X1=63+(X-L)/(R-L)*192:Y1=145*(
Y-YU)/(YL-YU)+1:YTEMP=Y
12135 GOSUB20:Y2=145*(Y-YU)/(YL-
YU)+1:Y=ABS(YTEMP-Y)
12140 IF INT(ZK/2)<>ZK/2 THEN AR
```

```
EA=AREA+4*Y ELSE AREA=AREA+2*Y
12145 LINE(X1,Y1)-(X1,Y2),PSET:N
EXTZK
12150 X=R1:GOSUB10:X1=63+(X-L)/(
R-L)*192:Y1=145*(Y-YU)/(YL-YU)+1
:TEMP=Y:GOSUB20:Y2=145*(Y-YU)/(Y
L-YU)+1:Y=ABS(YTEMP-Y):AREA=AREA
+Y:LINE(X1,Y1)-(X1,Y2),PSET
12160 AREA=DX/3*AREA:POKE65494,0
:RETURN
20000 '**INSTRUCTIONS
20100 COLOR0,1:PCLS:SCREEN1,0:ZM
$="THIS PROGRAM WILL DRAW THE GR
APHOF ONE OR TWO FUNCTIONS ON TH
E  CARTESIAN COORDINATE PLANE.":
ZP=0:GOSUB1000
20105 ZM$="IT CAN ALSO BE USED T
O FIND THE ROOTS OF AN EQUATION,
 TO SOLVE ASYSTEM OF TWO EQUATIO
NS WITH TWOUNKNOWNS, TO FIND THE
 MAXIMUM   OR MINIMUM VALUES OF
A FUNCTION,TO SHOW THE RELATIONS
HIP BETWEENTHE GRAPH OF A FUNCTI
ON AND ITS":ZP=96:GOSUB1000
20107 ZM$="DERIVATIVE, TO FIND A
REAS UNDER OR BETWEEN CURVES (TH
E DEFINITE INTEGRAL) AND TO SHOW
 THE EFFECTOF TRANSLATIONS, REFL
ECTIONS,    ETC. ON THE GRAPH OF
A FUNCTION.":ZP=320:GOSUB1000:GO
SUB5020:PCLS
20110 ZM$="TO GRAPH ONE EQUATION
, YOU MUST WRITE THAT EQUATION A
T LINE 10  IN THE FORM:  Y = F(X
)":ZP=0:GOSUB1000
20115 ZM$="EXAMPLE:  10 Y = 2*X
- SIN(X)":ZP=128:GOSUB1000
20117 ZM$="DO NOT USE ANY OTHER
VARIABLE   EXCEPT X AND Y.":ZP=1
92:GOSUB1000
20118 ZM$="THEN TYPE "+CHR$(34)+
"RUN 5"+CHR$(34)+" TO RESUME THE
":ZP=288:GOSUB1000:ZM$="PROGRAM.
":ZP=320:GOSUB1000:GOSUB5020
20120 PCLS:ZM$="YOU WILL BE ASKE
D TO SPECIFY THEDOMAIN (X-INTERV
AL) OVER WHICH  YOU WANT THE GRA
PH TO BE DRAWN.":ZP=0:GOSUB1000
20125 ZM$="AFTER ABOUT 15 SECOND
S, THE     GRAPH OF THE EQUATION
 AT LINE 10WILL BE DISPLAYED ON
THE SCREEN.":ZP=128:GOSUB1000:GO
SUB5020
20130 PCLS: ZM$="AFTER THE GRAPH
 HAS BEEN DRAWN, YOU WILL BE PRO
MPTED AT THE      BOTTOM OF THE S
CREEN WITH":ZP=0:GOSUB1000
20134 ZM$="<D><V><R><S><A><M>  <
H>ELP.":ZP=128:GOSUB1000
20140 ZM$="ENTER <D> IF YOU WISH
 TO RE-DRAWTHE SAME GRAPH OVER A
 DIFFERENT <D>OMAIN (X-INTERVAL)
.":ZP=192:GOSUB1000
20170 ZM$="ENTER <V> IF YOU WISH
 TO FIND   THE <V>ALUE OF THE FU
NCTION (Y- COORDINATE) FOR ANY V
ALUE OF X.":ZP=320:GOSUB1000:GOS
UB5020:ZP=192:GOSUB4700
20200 ZM$="ENTER <R> IF YOU WISH
 TO FIND   THE ROOTS (ZEROES) OF
 THE       FUNCTION (WHERE THE G
RAPH       CROSSES THE X-AXIS)."
:ZP=192:GOSUB1000
20210 ZM$="THE PROGRAM USES NEWT
ON'S METHODOF ITERATION TO FIND
THE ROOTS.":ZP=352:GOSUB1000:GOS
UB5020:ZP=192:GOSUB4700
20220 ZM$="NEWTON'S METHOD REQUI
RES THAT   YOU ENTER AN INITIAL
ESTIMATE OFTHE ROOT. YOU CAN GET
 SUCH AN   ESTIMATE BY LOOKING A
T WHERE THEGRAPH CROSSES THE X-A
XIS. THE   ESTIMATE DOES NOT HAV
E TO BE TOOEXACT.":ZP=192:GOSUB1
000:GOSUB5020:ZP=192:GOSUB4700
20230 ZM$="IF THE GRAPH HAS MULT
IPLE ROOTS,YOU CAN REPEAT THE PR
OCEDURE.":ZP=192:GOSUB1000:GOSUB
5020:ZP=192:GOSUB4700
20232 ZM$="ENTER <S> IF YOU WISH
 TO FIND   THE SLOPE OF THE FUNC
TION FOR   ANY VALUE OF X (IE. E
VALUATE ITSDERIVATIVE). THE PROG
RAM WILL   NUMERICALLY COMPUTE A
 GOOD      APPROXIMATION TO THE
SLOPE.":ZP=192:GOSUB1000:GOSUB50
20:ZP=192:GOSUB4700
20235 ZM$="ENTER <A> IF YOU WISH
 TO FIND   THE AREA BETWEEN THE
CURVE AND  THE X-AXIS (THE DEFIN
ITE INTE-  GRAL). YOU WILL BE PR
OMTED FOR  THE LIMITS OF INTEGRA
TION. THE  PROGRAM WILL PARTITIO
N THE":ZP=192:GOSUB1000
20237 ZM$="INTERVAL INTO 200 SUB
-INTERVALS AND USE SIMPSON'S RUL
E TO FIND  THE AREA.":ZP=384:GOS
UB1000:GOSUB5020:ZP=192:GOSUB470
0
20240 ZM$="ENTER <M> IF YOU WISH
 TO RETURN TO THE MENU OR <H> FO
R HELP IF  YOU CAN'T RECALL WHAT
```

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Princeton

October 9-11

RAINBOWfest

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer. Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time.** Princeton is the show to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in different parts of the country. If you missed the fun in Chicago, why don't you make plans now to join us in Princeton? For members of the family who don't share your affinity for CoCo, RAINBOWfest is located in an area with many other attractions.

A special feature of RAINBOWfest is the **Educational Sandbox**, which features **child-oriented workshops** to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through seventh-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

The Hyatt Regency Princeton offers special rates for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get your special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW *affiliate*, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

Come meet CoCo Cat in person!

That fun-loving feline is on the loose and ready to meet the CoCo Community in Princeton

Show Schedule:

Friday evening
— Exhibits open from 7 p.m. to 10 p.m.

Saturday
— CoCo Community Breakfast at 8 a.m.
— Exhibits open at 10 a.m. and close at 6 p.m.

Sunday
— Exhibits open from 11 a.m. to 4 p.m.

Free Seminars

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CoCo Community Breakfast

The traditional CoCo Community Breakfast sets more than a table for your dining pleasure! Enjoy lively conversations with CoCo enthusiasts and learn exciting and informative news from our keynote speaker, a specialist in the Color Computer Community.

In the works . . .

We're putting the finishing touches on The Educational Sandbox, a joint Tandy/RAINBOW effort. This is a computer workshop for RAINBOWfest kids. We're planning to have two sessions on both Saturday and Sunday. One workshop will be for the kindergarten through third-grade set, and the other for fourth through seventh graders. Each workshop will last between 45 minutes and one hour, and will give the children and their parents hands-on experience in using Tandy computers and software.

RAINBOWfest - Princeton, New Jersey
Dates: October 9-11, 1987
Hotel: Hyatt Regency Princeton
Rooms: $86 per night, single or double
Advance Ticket Deadline: October 2, 1987

Join us at a future RAINBOWfest!

RAINBOWfest - Chicago, Illinois
Dates: May 20-22, 1988
Hotel: Hyatt Regency Woodfield
Rooms: $64 per night, single or double
Advance Ticket Deadline: May 13, 1988

FREE T-Shirt to first five ticket orders received from each state.
First 500 ticket orders received get a Chromasette tape.

YES, I'm coming to **Princeton!** I want to save by buying tickets now at the special advance sale price. Breakfast tickets require advance reservations.

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____ Saturday CoCo Breakfast at $12 each total ______

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☐ Also send me a hotel reservation card for the Hyatt Regency Princeton ($86, single or double room).

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Signature ______________________

Advance ticket deadline: Oct. 2, 1987. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

```
           <D><V><R><S><A><M> ME
ANS.":ZP=192:GOSUB1000:GOSUB5020
LIST20250
20250 PCLS:ZM$="IF YOU WISH TO G
RAPH TWO        EQUATIONS AT THE
 SAME TIME, YOU MUST WRITE EQUAT
ION (1) AT LINE 10 AND EQUATION
(2) AT LINE 20, BOTH IN THE FORM
 Y = F(X).":ZP=0:GOSUB1000
20260 ZM$="EXAMPLE:  10 Y = X^2
- 3*X + 5             20 Y = 2*X
- 3":ZP=192:GOSUB1000
20270 ZM$="USE ONLY X AND Y FOR
BOTH         EQUATIONS.":ZP=288:GO
SUB1000:GOSUB5020
20280 PCLS:ZM$="AFTER ABOUT 30 S
ECONDS, THE     GRAPHS WILL BE D
ISPLAYED ON THE SCREEN. YOU WILL
 AGAIN BE       PROMPTED WITH:":
ZP=0:GOSUB1000
20290 ZM$="<D><V><R><S><A><I><M>
 <H>ELP":ZP=160:GOSUB1000
20300 ZM$="<D>,<V>,<R>,<A>,<M>,
AND <H>     HAVE THE SAME MEANING
 AS BEFORE.YOU CAN EVALUATE EITH
ER FUNCTION<V>, FIND THE ROOTS O
F EITHER    FUNCTION <R>, FIND TH
E SLOPE OF EITHER FUNCTION <S>,
OR FIND THE":ZP=224:GOSUB1000
20305 ZM$="AREA BETWEEN THE TWO
CURVES <A>.":ZP=416:GOSUB1000:GO
SUB5020:ZP=224:GOSUB4700
20310 ZM$="HOWEVER, YOU ALSO HAV
E THE       THE OPTION OF FINDING
 THE INTER-SECTION OF THE TWO GR
APHS BY     PRESSING <I>.":ZP=224
:GOSUB1000:GOSUB5020:ZP=224:GOSU
B4700
20320 ZM$="YOU MUST ENTER AN INI
TIAL        ESTIMATE OF THE INTER
SECTION     WHICH YOU CAN GET BY
LOOKING AT THE GRAPH. THE PROGRA
M WILL THENFIND THE EXACT VALUES
 FOR X AND":ZP=224:GOSUB1000
20330 ZM$="Y. IF THERE IS MORE T
HAN ONE     INTERSECTION, YOU CAN
 REPEAT THEPROCESS.":ZP=384:GOSU
B1000:GOSUB5020
20340 PCLS:ZM$="TO FIND THE RELA
TIVE MAXIMUM OR MINIMUM VALUES O
F A FUNCTION    WITHIN AN INTERV
AL, GRAPH THE   FUNCTION (LINE 1
0) AND ITS      DERIVATIVE (LINE
 20). THE MAXI-":ZP=0:GOSUB1000
20350 ZM$="MUMS OR MINIMUMS OCCU
R WHERE THEGRAPH OF THE DERIVATI
VE CROSSES THE X-AXIS.":ZP=160:G
OSUB1000:GOSUB5020
20360 PCLS:ZM$="THUS, FIRST FIND
 THE ROOTS OF   THE DERIVATIVE (
EQUATION 2) AND THEN EVALUATE TH
E FUNCTION      (EQUATION 1) AT
THE ROOTS OF THEDERIVATIVE.":ZP=
0:GOSUB1000:GOSUB5020
20370 PCLS:ZM$="TO GRAPH A PIECE
-WISE FUNCTION, SUCH AS:":ZP=0:G
OSUB1000
20380 ZM$="Y = 2*X          FOR X
< -1        Y = 3*X - 2     FOR -1
<=X<=2      Y = 5        FOR X > 2
":ZP=96:GOSUB1000
20390 ZM$="WRITE AT LINE 10:":ZP
=224:GOSUB1000
20400 ZM$="10 IF X<-1 THEN Y=2*X
 ELSE           IF X>=-1 AND X<=2
THEN Y=3*X     ELSE Y=5":ZP=288:G
OSUB1000:GOSUB5020
20410 PCLS:ZM$="YOU CAN USE A SI
MILAR TECHNIQUE TO GRAPH DISCONT
INUOUS FUNC-    TIONS. FOR EXAMP
LE, Y=1/X IS    DISCONTINUOUS AT
 X=0. TO GRAPH  THIS FUNCTION, W
RITE AT LINE 10:":ZP=0:GOSUB1000
20420 ZM$="10 IF X<-.1 OR X>.1 T
HEN Y=X         ELSE Y=0":ZP=160:G
OSUB1000
20430 ZM$="ALTHOUGH Y DOES NOT E
QUAL 0 FOR VALUES OF X BETWEEN -
.1 AND .1, THESE POINTS WILL BE
PLOTTED ON THE X-AXIS AND WILL N
OT BE       VISIBLE.":ZP=256:GOSU
B1000:GOSUB5020
25000 RETURN
30000 'WRITE EQUATIONS INSTRUCTI
ONS
30100 CLS:PRINT@0,"TO GRAPH ONE
EQUATION, YOU MUST WRITE THAT EQ
UATION AT LINE 10  IN THE FORM:
 Y = F(X)            EXAMPLE:    10
 Y = 4*X - SIN(2*X)";
30110 PRINT@160,"TO GRAPH TWO EQ
UATIONS, WRITE    EQUATION (1) AT
 LINE 10 AND      EQUATION (2) AT
 LINE 20.         EXAMPLE:   10 Y
= X^2 - 5*X + 3              20 Y
= 2*X - 5"
30120 PRINT@320,"USE ONLY THE VA
RIABLES X AND Y.":PRINT@384,"THE
N TYPE 'RUN 5' TO RETURN TO  THE
 MENU."
```

PIPELINE

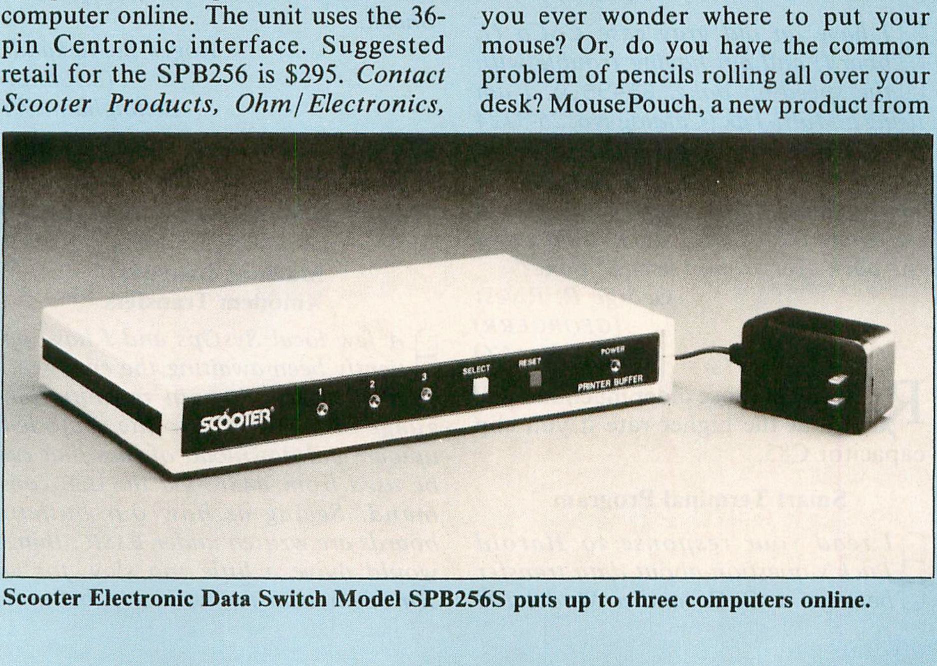
MORE PRIZES We recently received three additional prizes for The Fourth Rainbow Adventure Contest. Unfortunately, the prizes arrived too late to be included in the advertisement.

Sundog Systems has donated *Champion Action Arcade Adventure* and *White Fire of Eternity.* Both packages are on disk and sell for $19.95 each.

Bill Bernico of Kromico Software has donated *CoCo Size*, a computerized exercise program on disk.

TALENTED BUFFER Scooter Products Group, Ohm/Electronics, Inc., has announced the availability of the new Scooter Model SPB256 Data Switch/Multibuffer combination unit. This unit permits you to operate up to three computers with one printer. The built-in 256K buffer gives you the ability to store approximately 128 pages of data from any or all of the printers.

The SPB256 was designed primarily to meet the needs of businesses and educational institutions where multiple computers are often used in conjunction with one printer. A four-position front panel pushbutton permits you to select automatic online sequencing of all computers or to place an individual computer online. The unit uses the 36-pin Centronic interface. Suggested retail for the SPB256 is $295. *Contact Scooter Products, Ohm/Electronics, Inc., 746 Vermont St., Palatine, IL 60067. Call (800) 323-2727 (Illinois, call 312-359-6040).*



Scooter Electronic Data Switch Model SPB256S puts up to three computers online.

RADIO SHACK CONFERENCE The Fifth Annual International Conference on Education and Technology, designed to facilitate the exchange of information, software and technical expertise between nations, will be held March 28-31, 1988, at the University of Edinburgh in Edinburgh, Scotland.

Topics of discussion will include artificial intelligence, open and distance learning, new enabling technologies in education, computers, leadership enhancing technologies and teacher education.

The conference is being held outside of the United States for the first time, making it a true international event. In previous years, the conference has been held in Forth Worth, Texas, and hosted by Radio Shack's Education Division. The 1988 conference will be enhanced not only by the delights of Scottish hospitality but also by the history and culture of Edinburgh, one of Europe's most attractive capital cities.

MousePouch
Mouse HOLDER and MUCH MORE...
MousePouch
Mouse HOLDER and DESK ORGANIZER

The MousePouch from H&H Enterprises. A functional add-on; handy just about anywhere.

A HOME FOR YOUR MOUSE Did you ever wonder where to put your mouse? Or, do you have the common problem of pencils rolling all over your desk? MousePouch, a new product from H&H Enterprises, is designed to eliminate these problems. MousePouch will hold most any mouse (even a real one), or it can be used as a catch-all. The pouch hangs on the side of your desk with a small Velcro strip and can be easily removed should your mouse decide to relocate. In addition, the pouch can be used to hold up to eight 3½-inch disks.

MousePouch, which retails for $5.95, is available in two "configurations" — light gray with silver trim or natural tan with gold trim. *Contact H&H Enterprises, Box 2672, Corona, CA 91718, (714) 737-1376.*

EPSON ADD-ON Image Technology Inc. now offers an inexpensive, large-capacity buffer that mounts inside most Epson printers. This buffer allows you to transfer data to the printer at computer speed and get back to work immediately while your printer operates at its own pace. The user-upgradable buffer is easy to install in most Epson dot-matrix, parallel printers. It can be configured, by installing RAM chips, for 64K, 128K, 256K or 512K. The unit with OK installed sells for $109. A 256K unit costs $133 and the full-blown 512K is $157. *Contact Image Technology Inc., 8150 S. Akron Street, Suite 405, Englewood, CO 80112, (303) 799-6433.*

A Special Thank You

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

This represents the 49th consecutive monthly Doctor ASCII column. Many thanks to all the people who have contributed to it over the years, including Richard Libra, Ralph Ramhoff, Jesse Jackson, Raymond Rowe and, of course, the readers.

1200 Baud

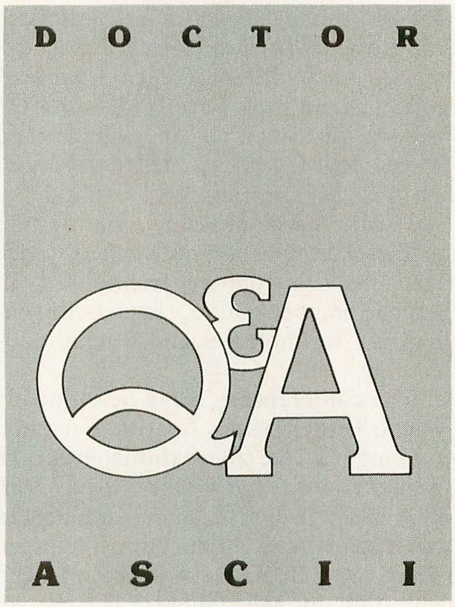
If I want to use a 1200 baud modem with my CoCo 2, do I also have to buy an RS-232 pack, which then means I must also buy a Multi-Pak Interface? Won't my CoCo 2 support 1200 baud?

John Bowden
Owensboro, KY

℞ With a 1200 baud modem and a CoCo 2 without a Multi-Pak, the CoCo's 6809 must handle the bit-banging of its internal RS-232 port, as well as uploading/downloading files, and still handle the screen display without dropping characters. To meet these objectives, you will need a terminal program that uses the standard 32-column display since it has the least overhead. The program *Greg-E-Term*, available from the author (Greg Miller, 9575 Roston Road, Grandledge, MI 48837) for $10 plus formatted disk, is especially tuned for this type of operation. If you need or desire higher resolutions, you will need either Tandy's RS-232 Pak, WordPak and a Multi-Pak, or a new CoCo 3.

Richard Esposito is a senior project engineer with Northrop Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.



Using the Speed-Up Poke

I have an old gray case CoCo (E board) and am having trouble with the speed-up poke, `65495,0`. *I am using a Multi-Pak (Catalog No. 26-3124 for the CoCo 2) and it locks up when I try the poke. It works fine without the Multi-Pak. What's up? Can I do a hardware fix, or am I stuck unplugging the pack every time I use the poke?*

George R. Rivest
(GEORGERR)
Boulder, CO

℞ Many of those older machines will run at the higher rate if you clip capacitor C85.

Smart Terminal Program

I read your response to Harold Luck's question about data transfer between a CoCo and a Model 100 (May 1987). I built the null modem cable needed to link the two computers. My question is: What smart terminal programs would you recommend I use in my Model 100? I am using the VIP terminal in my CoCo 2.

Leon L. Hawley
(LLH)
Chapel Hill, NC

℞ I use the built-in terminal program that comes in the Model 100's ROM.

Read/Write Difficulties

My CoCo has suddenly refused to read disk files. It will read from the disk once only from a cold start and then refuses to read or write to the disk again. I used the "CoCoChek" ROM pack and everything checked out except for the inability to read/write to the disk. ROM-RAMs-PIAs all checked out OK. I replaced all of the RAM chips, the CPU and the SAM chip with no change. I own an F board CoCo 1 with the final fix installed by Radio Shack.

Roger B. Alexander
(SALZAED)
Bellingham, WA

℞ It may be your disk controller. Try swapping controllers on a friend's machine or at a friendly Radio Shack store.

Machine Language Xmodem Transfers

A few local SysOps and I have patiently been awaiting the emergence of a public domain machine language subroutine for the Xmodem upload and download of files that can be used from BASIC via the `USR` *command. Seeing as how our bulletin boards are written under BASIC, things would move a little too slow for an Xmodem transfer with a subroutine* *written in BASIC. Thus, a machine language* `USR` *routine is an absolute necessity for us to be able to send or receive data fast enough to actually use and still have good data integrity. If you or any of the many other RAINBOW readers know of the existence of such a* `USR` *routine, please let me know.*

Lee Steensland
Co-SysOp of the Middle Kingdom BBS
Prospect, KY

℞ Contact Greg Morse, 10871 Roseland Gate, Richmond B.C., Canada, or look on Delphi for a copy of the source code for *XCOM9*, which is an assembler language terminal program for OS-9. In it is a code for Xmodem transfers, which you could adapt as a `USR` routine.

GET Errors

I have a CoCo 2 with 64K Extended BASIC. Whenever I try to use the `GET` *command, I get a DN Error message. This also happens with some of the sample programs in my BASIC manual. Why is this?*

Konnie Siewierski
Schaumburg, IL

℞ DN is a "device number" error. Try running the suspect programs on another CoCo to ascertain whether the problem is in your hardware. If it is the same on another machine, check to see that you have allocated a large enough array for your `GET` and that no spurious pokes are interfering with BASIC's operation.

Drive Recognition

I have a Teac double-sided, 40-track drive on my Color Computer 2. By using information from The Complete Rainbow Guide to OS-9, *I have been able to format my OS-9 disks with 40 tracks and use the second side as* `/d2`. *Recently, I purchased the Color Computer C compiler. The compiler files expect the C library to be on* `/d1`. *Is there a way that I can patch either the OS-9 files to make the second side* `/d1`, *or is there a patch for one of the C compiler files that will make them look for the C library on* `/d2`?

William Walter
Belvedere, IL

℞ The drive number used by CC1 can be altered with the OS-9 `DEBUG` utility by changing offset `$EE6` to the ASCII value of the desired drive number (Zero=`$30`, One=`$31`, etc.). Don't forget to type `VERIFY U` after saving the modified CC1 back to disk.

RS-232 With a Y Cable

I have access to a deluxe RS-232 pack, but I don't have a Multi-Pak Interface. Is there any problem with using a Y-connector with it? It might possibly work with some of the lines switched. I have a CoCo 3 with a standard RS controller.

Steve J. Viertell
(STEVEVIERTELL)
Chico, CA

℞ Although I do not recommend using a Y-cable, if you really want to use one, you need to remove the built-in ROM from the RS-232 pack because it uses the same adresses as the Disk BASIC ROM, which would cause bus contention problems. The built-in ROM contains a very primitive communications program that is not of much use on bulletin boards or Delphi anyway. Get a good disk-based terminal program that supports Xmodem protocol, which supports your RS-232 pack. Note that I see two potential problems with the Y-cable: taxing the marginal CoCo 3 internal power supply and opening the door to timing problems with the disk controller.

CoCo to PC Connection

I want to direct connect my CoCo to my PC Compatible to transfer data and programs (CoCo SIG to PC to CoCo). I tried to make a null modem cable, but it does not work. Can you tell me the necessary pin connections?

Paul L. Bristol
(PLB)
Beaver Dam, WI

℞ The best way to transfer programs to your CoCo from your PC is with the *CoCoUtil II* utility, which runs on your PC and reads, writes, performs file transfers and formats CoCo disks.

Drive Replacement

In your June column, you refer to an 80-track, 5½-inch drive (TEAC 55F). Will this drive or any other 80-track fit into the existing disk cases? I have an old (full-height) drive that is bad. I would like to pull it out of the case and replace it with an 80-track. Is this possible? If so, how detailed a modification will it be? I can get a bare 80 (Tandon TM101-4 or TEAC 55BF or MPI OSK). Will any of these work without a great deal of work and modifications?

Jimmy V. Lemke
(JIMLEM50)
Augusta, GA

℞ If your power supply is OK and cable to controller has no missing teeth, just put the new drive in the old case. If the cable has missing teeth, you'll need a new cable. The full-height drives are electrically equivalent to the newer half-height ones.

CoCo 2 and 3 Compatibility

I have a Radio Shack Appliance and Light Controller (Catalog No. 26-3142). I have used my CoCo F board computer to do the programming of the controller with no trouble. Now I have the CoCo 3 and find that the introduction banner displays OK, but when pressing the joystick button or the ENTER key, the graphics display and text get mixed up and the computer locks up. According to the Radio Shack catalog, the "CoCo 3 is compatible with CoCo 2 software in the CoCo 2 mode." I haven't been able to find any reference in the introduction, quick reference guide, or the Extended BASIC manuals to this CoCo 2 mode. Is it possible to use a "ROM Crack" program and transfer the program to disk and then patch it to run, or must I abandon the controller for a self-contained unit? I am using OS-9 Level II and am looking for new software. What can I expect?

Warren C. Hrach
(WAROCK)
Cleveland Heights, OH

℞ Sorry to be the bearer of bad news, but the CoCo 3 is *not* fully compatible with the CoCo 2. Radio Shack says that CoCo 2 software will work on the 3 if the software follows Radio Shack's rules. Unfortunately, in some cases, Radio Shack didn't follow its own rules.

Memory Chips

I have seen memory chips advertised as 200NS, 150NS and 120NS. What is the difference between each of them and which are the best ones for the 64K CoCo 2?

Armando Marin-Arias
(ARMARI)
Rio Piedras, PR

℞ The lower the nanosecond rating, the faster the chip. The cheaper, slower 200NS chips should work OK with your CoCo 2.

Column Errors

There were a number of incorrect statements made in your July column in the answer to JSA regarding DEFT Pascal. *First,* DEFT *is now published by TCE, which announced last fall that an upgrade for the CoCo 3 would be available. Second,* DEFT Pascal *is not copy-protected. However, TCE has decided to make the linker require a keylock-type of disk. The high ratio of users to buyers prompted this. Third, the reason it does not work, which you did not address, could be one of two things: 1) The boot code memory check will return a value for a 32K machine on a CoCo 3. The linker will not be able to link large files with only 32K. 2) The package from* DEFT, *Version 3.4 and earlier, had some timing problems with the disk I/O code. This usually showed up in the linker.*

As for OS-9 being the PASCAL *of choice, that remains to be seen. It has no string functions and suffers from very poor support. Tandy does not know much about it, and Microware won't talk to you unless you bought it from Microware. It won't even work on Level II without being patched!*

Kenneth R. Schunk
(KENSHUNK)
Gansevoort, NY

℞ I just read your bulletin on Delphi that TCE Programs is now shipping *DEFT Pascal*, Version 4.0, which will run on any CoCo with at least 64K of memory and, on a CoCo 3, will run at 2 MHz for everything but I/O. It was nice to read that a few bugs have been fixed, such as the problem with floating-point compares and the potential disk I/O problem on newer machines. Contact Ted at TCE Programs for more information on pricing, upgrades and availability of *DEFT Pascal*, Version 4.0.

I disagree with you regarding your definition of copy protection. A "key disk" to me is indeed copy protection.

> OS-9 PASCAL adheres to the ISO Standard 7185.1 Level 0. It's nice to see some competition in the CoCo 3 marketplace, and I wish you luck with your new product.

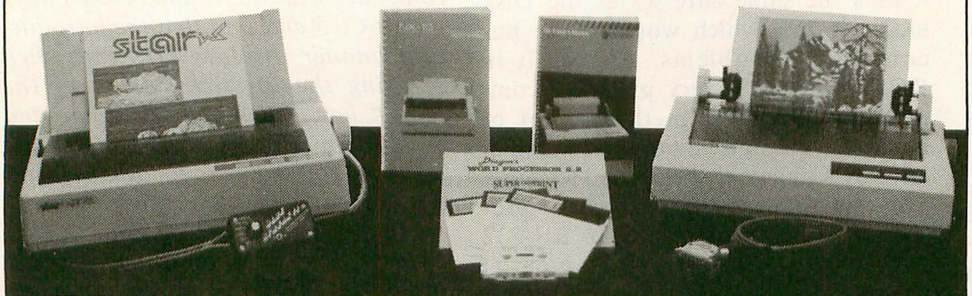
BOOT.BAS for CoCo 3

I noticed from your July column that many users are interested in the `BOOT.BAS` *program in the Source topic of the database. I just wanted to mention that Mike Tolbert (MIKEGT) has converted the program for operation on a CoCo 3. His version makes use of the extended graphics abilities of the CoCo 3. The file is available in the Utilities topic of the CoCo SIG's database. (Mike also generously provided the source code for the ML portion in a file for the Source topic.) He calls the new version* `BOOT3.BAS`.

Donald D. Hutchison
(DONHUTCHISON)
Norcross, GA

℞ Thanks for the information, Don.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.



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Reviewed in '87 March Rainbow

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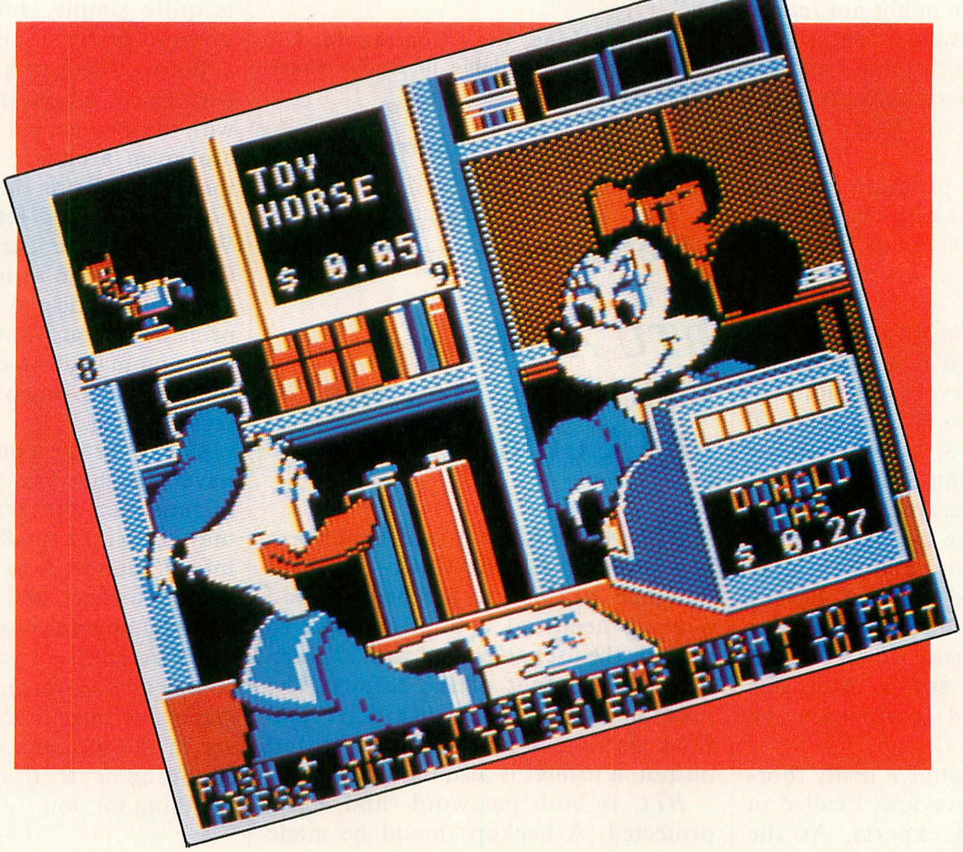
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PRESS BUTTON TO SELECT PULL ↓ TO EXIT

Software CoCo 1, 2 & 3

OS-9

Donald Duck's Playground — Teaches the Value of Money

Tandy is now featuring a new line of software for the CoCo. While the programs have been around for some time, this is where Tandy's position on requiring that all new CoCo software they are going to support must be written to operate under OS-9 comes to our advantage. Programs written for other computers are easier to port over to the CoCo under OS-9, and now we are beginning to see the fruits of Tandy's CoCo position, more "new" software.

The new line of software is produced by the combined efforts of Walt Disney Studios and Sierra On-Line. I must say that the programs contain some of the best graphics and animation that I have seen on the CoCo. They are targeted at the younger crowd (elementary age) and express the Disney/Sierra motto of "Playing For Fun/Learning For Life." They "appear" to be fun games, but manage to slip in some very educational information. For instance, take *Donald Duck's Playground.* Through the use of some very skillful animation, the avowed purpose of the game is to help Donald build a playground for his nephews.

In order to buy the equipment to build the playground, Donald has to go to work at various jobs to earn money. Each of the four jobs is an animated game unto itself. Once the job is done, Donald gets paid. His payment is graphically displayed in dollars and/or coins on the screen, as well as by total numerical figures. (This is just another one of the sneaky educational tricks; it helps the young to associate numerical sums with actual coins and dollars.) Then he has to go out and buy various bits of playground equipment. Here is where the primary educational part comes in — making change.

Once an item is selected, a total for that item is posted on the screen, and the user is shown how much money he/she has in dollars and coins. The user has to select the proper amount of coins and/or dollar bills and move them onto the counter by the cash register. If the sum of money paid is more than the total owed, then the cash register opens, the cash drawer comes out, and the user must collect the appropriate change in dollars and/or coins.

Once the equipment is paid for, it is delivered to the playground and randomly placed in one of 15 locations on one of three levels. Here we get a little exercise in logic. The user quickly learns that in order to get to one of the two upper levels of the playground, he or she must buy and install some sort of ladder to go up to each playground level. The equipment may be freely rearranged also. This all calls for some preplanning on the user's part.

Oh yes, you can visit the playground at any time and, through computer animation, cause one of Donald's nephews to play on each item of equipment.

The plain fact is that if it were not for the note to parents on Page 3 of the program manual, you might not realize that this program was intentionally designed to be an educational tool, it is just that much fun to play. But the educational content is there, of that there is no doubt.

Not only does the program teach its primary lesson of making change, but it also teaches the concept of "labor for pay," and it does it in a very positive way.

Donald Duck's Playground is advertised for a 64K CoCo 1 or 2. But as it is written in OS-9 Level I, Version 2.0, it will run on a CoCo 3; I tested it. Of course with a CoCo 3, you have to use a color TV or color composite monitor, as the graphics screens are all equivalent to `PMODE 4` and make use of artifacted colors. In fact, the programmers couldn't have picked a better Disney character to use, as Donald's blue sailor suit and red-orange beak works out just right with artifacted colors. Also, one joystick is required to operate the program.

Now, to give this game a really thorough testing for this review, I called in two of my resident experts. As the program is billed for ages 7 to 11, I called in my 8-year-old computer wiz son, and as it is supposed to be educational, I called in my elementary school teacher wife.

Letting my son try out the program may have been a mistake, because it was an hour later before I could regain control of our computer. I think that speaks well for the program. However, it did give the resident school teacher an opportunity to observe the program in action, and for educational content, she gave it a solid 'A+'.

The game has three levels of play, which can be selected at the beginning of the game. This enables younger children or beginners to start out easy and work up. For older children, the advanced level provides them with more difficult challenges.

While dressed in an arcade-style game format, this is not a win/lose type game. It continues until you decide to quit and press the BREAK key. This is an excellent way to present an educational-type game as it avoids causing a great deal of frustration in the user and, hence, causing him or her to drop one game and go on to another.

Donald Duck's Playground is very well-done, and even though it is advertised for ages 7 to 11, this old dad had a lot of fun reviewing this program for his kid and for RAINBOW. I would certainly recommend this one.

(Sierra On-Line, Inc., Coarsegold, CA 93614. $34.95: Available in Radio Shack stores nationwide)

— Kerry Armstrong

Software CoCo 1, 2 & 3

BTU Analysis — Calculates Heating and Cooling Needs

BTU Analysis, by A to Z Unlimited, is a program for the CoCo 1, 2 or 3 designed to analyze the heating and cooling needs of a building and to provide the user and client with a screen or printer output of the results. The program requires one disk drive and Disk BASIC. If you want a printed output, a printer is also required.

BTU is both password- and copy-protected. A backup should be made but can only be used to restore the original disk. The program is run from the original disk using the password provided. A to Z Unlimited will replace the original disk in the event it cannot be restored with the backup.

The program begins by asking if you are using a CoCo 1, 2 or 3, and whether you want to set the printer baud rate or boot the program. You are then presented with a high resolution graphics introduction screen followed by the password request and a disclaimer notice. You may request online instructions if you so desire.

Next you are presented with a series of 11 questions about the premise you are analyzing, regarding design temperature; outside perimeter of the building; inside wall height; wall insulation; number of doors; number of windows; storm windows and doors; floor area to be heated and cooled; a basement, crawl space, or slab; insulated or heated floor area; and ceiling insulation.

The program handles calculations for conventional heating systems. Nonconventional systems require a specialist to analyze.

When deciding on the number of doors and windows, you must translate your window sizes into the equivalent number of 15-square-foot windows and 20-square-foot doors before answering those questions since the calculations are based on those two sizes only. This is quite simple, and instructions are given to perform this translation.

Before the actual calculations are performed, all questions are displayed with the answers you provided, and you are given a chance to correct any of them by choosing the appropriate question number and retyping the answer. When all answers are correct, pressing C produces the resulting calculations. They may be displayed on the screen or printed. If you want to make another run, you may do so by simply changing the answers to any of the questions and recalculating.

If you operate a business and want to have your business name and address included on the printed output, you may do so for a small fee by sending this information to A to Z Unlimited. Registered owners will also be provided periodic upgrades for a small fee.

BTU Analysis is easy to use and completely self-prompting. I found no detectable bugs in the software. If you are in the business of heating and air conditioning, *BTU Analysis* may be just the thing for you.

(A to Z Unlimited, 901 Ferndale Boulevard, High Point, NC 27260; 919-882-6255. $39.95 plus $3 S/H: First product review for this company appearing in THE RAINBOW)

— Larry Birkenfeld

Software CoCo 3

Rickeyterm — Friendly and Useful Terminal Package

Rickeyterm is a basic data communications package that runs on the CoCo 3 and requires a disk drive and a modem. Users with a monochrome or RGB monitor may make use of *Rickeyterm*'s 80-column mode, while others may use *Rickeyterm*'s 40-column mode. An optional RS-232 cartridge is also supported, if present. *Rickeyterm* is supplied on disk and includes three pages of documentation.

Rickeyterm is copyright 1987 by its author, Rick Adams, whose Delphi username is RICKADAMS. It was written to meet the immediate needs of its author, who then decided to share it with others by distributing it under the "freeware" concept. *Rickeyterm* enables the user to communicate with another computer via modem and to perform uploading and downloading using either straight ASCII or Xmodem protocol. *Rickeyterm* uses a buffer to perform these functions.

Rickeyterm is marketed commercially by Spectrum Projects, which gives an even wider audience access to it. It is also available via downloading from the CoCo SIG on Delphi. The connect time charges for downloading the *Rickeyterm* package at 300 baud would be approximately $2 to $3, somewhat less at 1200 baud. A sample file of "strings" for *Rickeyterm* is also available on Delphi.

The documentation as supplied by Spectrum differs significantly from that supplied on Delphi or from the author of *Rickeyterm*. The content is basically the same, but the printed copy from Spectrum has had all blank lines removed in order to fit the document onto three sheets of paper, printed front and rear. The *Rickeyterm* package includes the following programs: Rickeyterm User's Guide, BASIC loader and machine language portion.

The BASIC loader sets up various parameters, loads the machine language portion of *Rickeyterm* and then executes it. By examining the BASIC loader program, the user will be able to alter *Rickeyterm*'s parameters in order to suit individual preferences. The user may modify screen width, colors, drive stepping rates and baud rates for the serial port and the RS-232 cartridge, if present. Several communications parameters, such as flow control, line feed after carriage return and duplex settings, are also user-definable. The BASIC program is well-commented, which makes such modifications easy to perform. The foreground and background color parameters are especially interesting to experiment with.

Rickeyterm makes extensive use of windows, and herein is one of its secrets to a user-friendly interface. The upper half of the screen is used for special functions, while the lower half is always used for communications functions.

One of the design criteria for *Rickeyterm* was to provide the ability to communicate at all times, regardless of the other functions that the terminal program might be performing. The goal was to provide maximum user awareness while online.

As Rick put it, "When I'm online, I want to see what's going on at the moment and don't want the screen to blank out and be replaced by a full-screen menu display when I want to do something. It makes me nervous. How would you like to be driving down the freeway, push a button to change the station on the radio, and have the windshield suddenly appear opaque and display a menu of available radio stations?"

Rickeyterm was, therefore, provided with its unique abilities for viewing the buffer and entering text into the buffer, while still providing a view of what is happening online. One of the few exceptions is during disk I/O, which is unavoidable.

Rickeyterm's command structure is especially easy to use. To invoke a *Rickeyterm* command, you simply press the ALT key and one other key, depending upon which function is desired. For instance, pressing the ALT and H keys will produce a help screen showing all of *Rickeyterm*'s available commands. This is an especially user-friendly feature.

Pressing ALT and C will invoke *Rickeyterm*'s Conference mode. This command is best used when "in conference" on Delphi. While in this mode, an inverse video line will appear at the top of the screen. All keyboard input while in the Conference mode will appear inside this line; when the ENTER key is pressed, the message is sent. Without this feature, it would be very difficult to see what you were typing because messages from other users would fly across the screen and become intimately intermingled with your own typing.

The buffer may be toggled open or closed. When closed, an underline cursor is displayed; when open, a block cursor is used. Text messages are also displayed on the screen as the buffer is opened or closed. If the buffer becomes full, it automatically closes and the cursor returns to an underline character to inform the user.

The Buffer View mode deserves special note. While in this mode, communications continue normally in the lower window, while the upper window displays the contents of the buffer. The arrow keys will scroll through the viewing window a line at a time, while the shifted arrow keys may be used to scroll through the window a screen at a time. This provides quick scrolling through the buffer display. At the same time, use of the other keyboard keys results in keystrokes being used in communications.

The main purpose of the Buffer Entry mode is to compose multiline messages while in conference, which assures that your complete train of thought is placed into a conference message. Enterprising users will find plenty of other uses.

The ALT-M sequence can be used to

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mark the beginning and the end of a "buffer block." This command only works while the Buffer View mode is active. Other ALT-key sequences allow you to read a disk file into the buffer or write the buffer or a marked portion to disk.

If an RS-232 cartridge is in use, online printer support through the CoCo's standard serial port is provided through the use of the ALT-P sequence. The entire buffer or a marked portion of it may be printed while communications continues. This is an unusual feature and may well prove valuable to many users.

Invoking the Buffer Entry mode causes the screen to split into an upper and a lower window, similar to the effect of the ALT-V (Buffer View) command. However, entering the Buffer Entry mode clears the buffer, and all subsequent keyboard input is appended to the buffer display in the upper window. The left arrow key is used to backspace. Interestingly, this key allows you to backspace past the left margin, thus giving access to the previous line(s), if desired.

When you have entered the message you want to send, use either the ALT-B command to send the contents of the buffer or press the BREAK key. If the BREAK key is pressed while in the Buffer Entry mode, the contents of the buffer will be sent, and then the buffer will be cleared. You may then enter another message.

Rickeyterm is set up in such a way that the right joystick button causes a carriage return to be sent. When scrolling through forum messages, some people like to lean back in their chair with their joystick in their lap, so they can simply tap the joystick button whenever they want to bring up the next forum message. Many consider this to be the ultimate in "mellow" behavior and quite indicative of the attention to small details that has been included in *Rickeyterm.*

Rickeyterm also provides support for special characters, such as escape, true line-break, DEL, upbrace, caret, backquote, tilde, left and right brackets, curly braces, back slash and underscore. Those who regularly communicate with mainframes, especially those running under UNIX, will appreciate this added keyboard support. *Rickeyterm* is the only CoCo terminal program to my knowledge that provides this feature.

A special feature of *Rickeyterm* is support for the sending of "strings," or predefined text sequences. The strings may be read into the buffer from disk, then referenced and transmitted by name. Strings can be arranged to form simple text "pictures" for the amusement of others. To help with the creation of personalized strings, Rick has graciously donated a set of sample strings to the CoCo SIG's database on Delphi.

Ten special string names may be used to send strings with a minimum of keystrokes. The strings named &0 through &9 are automatically sent whenever the commands ALT-0 through ALT-9 are entered. If a frequently used string were defined in the string file as &3, for example, it could be sent with an ALT-3 command. Other functions are provided within *Rickeyterm* to list and preview the available strings.

I've found *Rickeyterm* to be an exceptionally friendly and useful program, one which will be of value to all telecommunicating CoCo 3 owners.

(Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414; 718-835-1344. $39.95 plus $3 S/H)

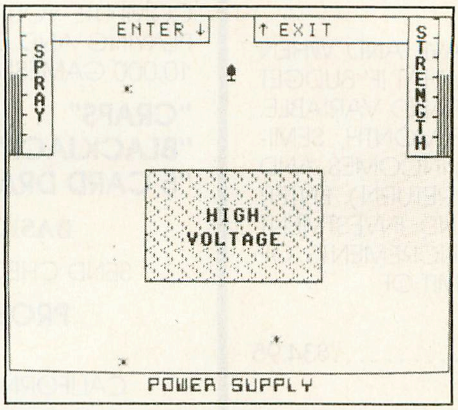
— Don Hutchison

Software

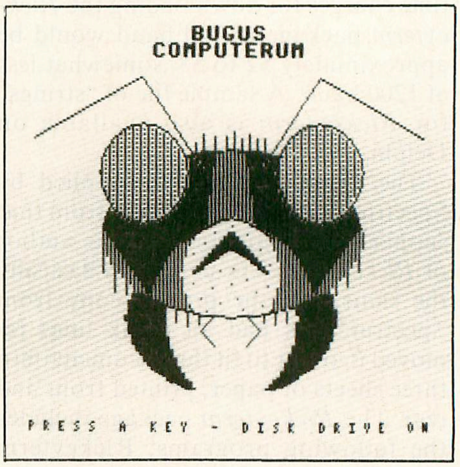
CoCo 1, 2 & 3

Bug Buster — Who Ya Gonna Call?

Have you ever wanted a chance to seek and destroy those dreaded computer bugs without extensive and tedious programming or messy hardware modifications? Then *Bug Buster*, a new arcade-type game from Tothian Software, is for you.



The scenerio is that you are able to *enter* your computer system with a certain number of "spray cans" in order to kill the various bugs that have infested it. You are a tiny figure controlled by the right joystick and have the ability to spray a beam of bug-fatal energy. You must explore the various parts of your system (ROM, RAM, disk drive, printer, etc.) and eliminate the other little spider-like figures found there. Unfortunately, you also face the peril of the bugs retaliating with *Bug Buster* fatal energy and incidental hazards of the system itself (such as the printer striking you into oblivion or stray bolts from the power source), both of which drain you of a strength point.



There are five separate sections of your computer under attack by the bugs. Each section uses one playing screen. Because each screen takes up one 6K graphics screen, the game is configured for both 32K and 64K. If you have a 64K system, the program will load all of the various play screens and keep them in memory; otherwise, it will load each screen as it is entered.

Before you enter a section, you must decide how many cans of bug spray you want to take with you. Each can costs 1 strength point and can fire 10 shots. You don't want to buy too many, for you can't take any excess to other sections of the computer, but you also get penalized for buying too few. One of the major factors in deciding how many cans to purchase is the level that you are currently playing. One can is sufficient for level one, for one shot is enough to exterminate one bug. At higher levels, the bugs get tougher, and it takes progressively more shots to kill them.

And that's about it. As you progress, the bugs grow in number and strength, and it takes more and more shots to defeat them. You keep entering the same areas with little change, fighting the same (except tougher) bugs and avoiding the same hazards.

The graphics are reasonable, but not spectacular. The animation is also a little slow. The game is programmed in a combination of BASIC, compiled BASIC and assembly. This can account for the attitude of the graphics and animation, because of the inherent slowness and other limitations of the BASIC language.

Bug Buster is enjoyable. However, one simply cannot play it for an extended period of time without wondering when you are going to finish. The concept is cute and amusing. The graphics and animation are adequate for its purpose. This is not an exceptional game but, for the price, can be a humourous break from other, more serious exploits on the computer.

(Tothian Software, Box 663, Rimersburg, PA 16248. $19.95)

— Glen Dahlgren

Software
CoCo 1, 2 & 3

Disk Anti-Pirate — Protects Your Programs

Disk Anti-Pirate is a utility program for use on your Disk Extended Color BASIC CoCo with at least 16K of RAM. The program is not difficult to use, but specific steps must be followed in order to use it effectively. The program is menu-driven, and full instructions are provided in a 16-page instruction book.

With *Disk Anti-Pirate* you can create ML autostart loaders for your BASIC and ML programs and disable the RESET, BREAK and CLEAR keys to restart the program. You can encrypt your programs to prevent listing or otherwise disassembly of them and mask the code so that `LIST`, `LLIST`, `CLOAD(M)`, `CSAVE(M)`, `EXEC`, `POKE`, `DEL`, `EDIT`, `TRON`, `TROFF`, `PEEK`, `USR`, `LOAD(M)`, `SAVE(M)` and `MERGE` will only function with your own private password.

The program also features self-contained error trapping for BASIC and ML programs. A title screen editor is included, which can be used to dress up your programs.

I found *Disk Anti-Pirate* to do all it claimed. I was able to "protect" several of my own BASIC programs and even some commercial games. It was effective in thwarting most copying techniques, but I don't believe it will foil the real pirates in the CoCo world any more than a dead-bolt on my house will keep out a professional burglar. The point here is that if you expect your software to be totally protected, you are fooling yourself. Somewhere, somehow, someone will find a way.

I think *Disk Anti-Pirate* is a worthwhile program that offers some unique protective features that most CoCo users will find useful and "Blue Beard" will find challenging.

(Microcom Software, P.O. Box 214, Fairport, NY 14450; 716-223-1477. $59.95 plus $3 S/H)

— Jerry Semones

Software
CoCo 1, 2 & 3

An Education — from Thompson House

Thompson House is offering educational programs for preschool and first grade level students to study numbers, math, the alphabet and spelling.

Available are four separate programs on cassette or 32K disk: *Build-a-Word, Counting Things, Error Trap Number Facts* and *Error Trap Spelling.*

Build-a-Word teaches letter recognition and alphabetical sequence. The student, teacher or parent sets up a list of words. The computer then shows an alphabetical sequence, and the student picks the next letter to eventually spell each word in the practice list. *Guess My Word* is part of this package.

Counting Things includes three subprograms: *Matching Things*, where the student matches keyboard numbers to numbers on the screen, *Counting Things*, which lets the student count boxes and circles and *Abacus Counting*, where the boxes to be counted are smaller and enclosed in an abacus-like grid.

Error Trap Number Facts and *Error Trap Spelling* give the student a chance to go over a list of spelling or math problems. The list can be made by the student or teacher from the keyboard for a single lesson, or loaded from tape or disk. Errors are saved as a separate list that can be called up and practiced.

Del Turner has prepared four educational programs for the CoCo that any father could be proud of. I recall doing things like this myself a few years back when there weren't so many really well-done professional items for our CoCo.

(Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3. $22.95 each)

— Bob Dooman

Software
CoCo 1, 2 & 3

CoCo Midi 2 — High-Tech Creativity

MIDI, an acronym for Musical Instrument Digital Interface, has forever changed music composition and performance. Recording studios use MIDI in non-synthesizer applications, including automated control of mixers and special effects units (such as digital reverbs and noise gates). And fast MIDI data transmission rates (31.25 kilobaud) make Large Area Networks (LANs) possible at a low cost.

CoCo Midi 2 is written entirely in assembler under Disk Extended Color BASIC and is an excellent example of what the MIDI excitement is about.

CoCo Midi 2 runs on any CoCo, without modification. (It does not take advantage of the CoCo 3's memory and graphics features, however.) It includes MIDI software and a ROM pack hardware device featuring two five-pin DIN-type MIDI ports on the side. Also included are two medium length professional MIDI cables. These are a $30 value offered free.

With all the equipment off, the hardware pack is inserted into Multi-Pak Interface Slot 3 (although a Y-cable, at extra cost, can be used). The two DIN plugs on the hardware pack are labeled "MIDI-in" and "MIDI-out" on the face of the hardware pack. Simply connect the MIDI-out from the pack to the MIDI-in on your synthesizer; then connect the MIDI-out from your synthesizer to the MIDI-in on the pack.

Power up everything and insert a backup of *CoCo Midi 2* into Drive 0. After typing `LOADM "COCOMIDI` and pressing ENTER, you are greeted by a copyright message in colorful semigraphics. *CoCo Midi 2* loads in the rest itself and leaves you at the main menu.

The main menu allows you to get a directory of two kinds of MIDI files; load and save these files. It also provides an interface to *Lyra* files. From here you enter two other major portions of the program: the Editor and the Control Menu.

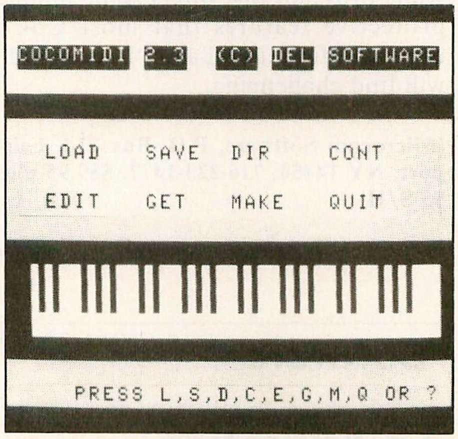
The directory listing distinguishes the two kinds of MIDI files you create with the extension `.A` and `.T`, denoting "All" and "Track," respectively. For instance, if you wanted to create a disco song with a bass sound, a rhythm keyboard sound and a lead keyboard sound, you could create the individual parts one at a time and save them as you go along. These musical parts (called "tracks" by recording studio convention) would each be saved with a `.T` extension. Once you finished the arrangement, you could load each track one after the other, do any final touching up, and then save them all at once with an `.A` extension. *CoCo Midi 2* saves tempo and MIDI channel parameters when saving your arrangements with the `.A` extension.

When loading files, *CoCo Midi 2* gives you the choice of loading those files with the `.A` extension or those files with the `.T` extension. It's easy to list these filenames to your monitor, so you don't have to memorize them.

The main menu also gives you a way to exit the program. On the CoCo 1 and 2, a software cold start was correctly performed. It did not correctly cold start on the CoCo 3 under the CoCo 3 C-DOS I use, but that is not a serious problem.

The Control Screen is where most of the musical action takes place. Here you record your individual tracks. During your recording session, you can play back these tracks either one at a time or all together, depending on which tracks you have turned on. (During playback, an entertaining graphics keyboard on the menu screen plays the notes for you.) You can record up to 16 tracks, each of which can be monophonic (one note at a time) or polyphonic (many notes at once).

A wide variety of commonly used time signatures is available, including 4/4 (the default), 2/2, 8/8, 3/4, 5/4 and 9/8. You can define any other time signature as long as it doesn't exceed 5/4 or 9/8.



```
COCOMIDI 2.3  (C) DEL SOFTWARE

LOAD    SAVE    DIR     CONT
EDIT    GET     MAKE    QUIT

PRESS L,S,D,C,E,G,M,Q OR ?
```

The Control Menu allows you to filter out unwanted MIDI data. MIDI not only standardizes which notes will be played when, but how loudly they play, whether they play with special effects, or even whether they play on an ordinary pitch. Bytes are included to keep synthesizers and sequencers in time and in tune.

You can easily imagine situations where you would exclude some of this data. For example, if you record a bass track for a pop dance song, you may want every note to sound equally loud. By filtering out "attack velocity" MIDI bytes, your track will play consistently loud despite any inconsistency in your playing.

When this kind of data is filtered out, you also save memory in the MIDI software. In big MIDI recording projects, this can be valuable.

Thanks to MIDI, you only need to own one synthesizer with a keyboard. It should feature attack-velocity sensitivity and "after-touch" (also called "pressure-sensitivity"), as well as a joystick or other controller device for altering filters and oscillators "on the fly." Your main keyboard is then a "controller" keyboard.

If you need thicker sounds, you may hook up additional synthesizer "modules" to your controller keyboard. These contain only the electronics of another synthesizer and do not include a keyboard.

CoCo Midi 2 supports this kind of setup by allowing your controller (whether or not it creates its own sounds) to send its MIDI data both *to* the program and *through* the program to a synthesizer module. This way you can hear what you're doing while recording.

This "MIDI Thru" software option may also make *CoCo Midi* a little less expensive to produce, since no MIDI Thru port needs to be added to the hardware pack.

A keyboard-oriented studio would not be complete without a drum machine. Drum machine programming or sequencing is usually supported by the drum machine's built-in software. Once you have planned out and created the drum patterns for a song, you may want *CoCo Midi 2* to play with your drum machine. There are two ways to do this.

First, the software clock that *CoCo Midi 2* uses can control the tempo of the drum machine and your tracks. Thus, the CoCo is the "master" and the drum machine is the "slave." The Control Menu allows you to set up this config-

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uration by selecting Master Tempo mode. The other way to synchronize your drum machine to your tracks is to have the drum machine's clock run the CoCo clock. This is the Slave Tempo mode.

If your drum machine produces what is called "sync tone," then you are no longer limited to 16 tracks on your *CoCo Midi 2* sequences. The experienced MIDI user will know how to record the drum machine's sync tone to multitrack tape in a studio and how to use that recorded tone to synchronize any number of future drum machine and *CoCo Midi 2* sequences. Imagine a composition of yours with 50 parts going all at once!

In a recording studio, there is usually a hi-tech-looking box next to the engineer with lots of lights either on or off or red or green, depending on whether an artist is recording on a track or simply listening to it.

The Set Screen is a software counterpart to this. Here you determine which tracks will be recorded and which will be played back. But there are additional features. You can give long descriptive names to each track, specify which of 16 MIDI channels you want each track to play over, and transpose your track up to an octave higher, in half-step intervals. If you compose a song for an alto singer who hates it, there is no need to rewrite it for that soprano who loves it — just transpose each track up into her range.

The Set Screen also keeps track of the memory that each track uses up. This comes in handy when you decide to filter out MIDI data to free up RAM for that next, all-important track.

Great studio musicians spent years perfecting their ability to play on the beat. They are so subtle in their understanding of "tempo" that they even engage in heated debates about what "on the beat" means.

Not all of us have the time or inclination to develop a perfect "sense of time," so most sequencers, including *CoCo Midi 2*, offer "quantization." If you play a series of quarter notes in a bass track almost perfectly on the beat, you can make them perfect by shifting the beginning of each note to the precise beginning of each beat. You might be using "eighth-note quantization" for this.

For passages using eighth notes or sixteenth notes, you will have to use even finer quantization resolution. Otherwise, you run the risk of two eighth notes being quantized to the same downbeat.

Another way to fix your music is to simply do it over — and that process is made easier with the Punch In and Punch Out feature. "Punching in" is the act of re-recording just the incorrect part of a track. It works like this. The computer will let you hear any tracks set to "on" until it reaches the punch-in point on the defective track. Then you hear all other tracks in Playback mode while you replay the defective track in Record mode. This track will continue in Record mode until it reaches the "punch-out" point. Then it simply continues playing back every track.

By setting up punch-in and punch-out points on either side of a difficult passage, you can repeatedly practice, at any tempo and in any key, knowing that once you get it right, *CoCo Midi 2* has preserved it forever.

If you can't fix a passage with quantization or punching, you may have to resort to the Editor. The Editor is also the place where you can insert special MIDI bytes that activate features on your synthesizer, which many sequencer/recorders can't record. (These bytes contain System Real-Time data. I know of a $15,000 sequencer that can't record System Real-Time data.)

Especially useful is the ability to "edit in" program change bytes. You can have your flutes change to steel drums in the wink of an eye by including the right byte information.

The Editor is very low-level and requires patience and knowledge. (Several examples are given, and an appendix to the manual explains standard MIDI data format.) The MIDI events are broken down in measures, beats and ticks; it is up to you to find the error and use the available editing commands to correctly add or delete MIDI events.

Another great feature of the Editor is the ability to include bytes that will repeat a section of a track as many times as you like. The repetitive nature of commercial pop music makes this feature worthwhile.

CoCo Midi 2 is not copy-protected, so backups are a snap. It's menu-driven and sensitive to most of the user's needs; I had it up and running in five minutes.

Recording real-time polyphony is a feature some sequencers don't have and it's really appreciated. Its over 40K memory allotment for data is plenty for most applications. Transposition and quantization make recording easier for semipro and lazy-professional instrumentalists.

It interfaces with *Lyra*, Speech System's graphics-oriented composer/editor. It does not require an MPI, although the alternative is that plague, the Y-cable. It runs on all CoCos very nicely.

The drum machine interface, punch-in and punch-out, and filtering are professional features musicians have come to expect from MIDI sequencers. The inclusion of two top-notch MIDI cables is also a real plus.

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The manual is well-written. Good grammar and a useful tutorial with key-by-key instructions make learning *CoCo Midi 2* easy, although the Editor is hard to use unless you truly understand MIDI at the byte level.

CoCo Midi 2 is every bit as good as any sequencer I have seen. And, Rich Parry says that a Step-Time entry mode is being finished right now.

CoCo Midi 2 is a good buy, and I predict subsequent releases will be even better.

(Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510; 312-879-6880. $149.95 plus $3 S/H)

— Paul Ward

Software CoCo 1, 2 & 3

Dollar Wise — Borrowing With Confidence

Several years ago, right around tax time, I wrote a simple amortization program for my Color Computer. It was a quick and easy, no-frills program to do exactly one function. Since then, each tax season, I search frantically through my disks looking for that program. When I find it, I tell myself, "Someday I should enhance this thing and make it more useful. But not today, of course. . . ."

Well, now it's too late. Prickly-Pear Software beat me to it. Their new program, *Dollar Wise*, provides capabilities for a wide range of personal finance applications.

Upon running *Dollar Wise*, the user is greeted by a delightful title screen, which is the least useful but most visually appealing feature of the program. This disappears all too quickly and is replaced by a screen prompting you for your printer baud rate. After this is entered, the main menu appears, offering a selection of six different functions: Loan Information, Savings Accounts, Mortgage Interest, Rent/Buy Decisions, Real Estate Loan with Balloon Payment, Print Loan Amortization Table and Exit.

The Loan Information option allows you to enter any two of the following: payment amount, amount financed, or number of payments It then computes and displays the third. I put this option through a very rigorous test, as I anticipate being in the market for a new car in the not too distant future. I have spent quite a bit of time juggling numbers with this option, and as a result, when I actually start lurking around car lots, I will be much better prepared.

The Savings option computes total balance in a savings account and interest earned, given an initial amount, interest rate, number of years, frequency of compounding, and, optionally, amount of monthly deposit.

The Mortgage Interest function asks for some basic information regarding a loan and computes total interest paid in any tax year. It takes into account the number of payments made in the first year and can actually be used on any installment loan.

If you are considering the purchase of your first home, the Rent/Buy Decision function does an interesting comparison of the cost of buying versus renting. It asks for a rather lengthy list of parameters, some of which require some research to provide. Once these are entered, *Dollar Wise* provides you with the "break-even point," the year in which the initial costs of buying are balanced by the higher year-to-year cost of renting. Beyond this point in time, you are presumably better off buying than renting, due to the increasing equity in your home. In addition, you may request a comparison for any point in time, showing the accumulated dollar total you will have paid to rent, or to buy, during that interval.

If you have, or are considering, a second mortgage with a balloon payment, *Dollar Wise* has the capability of determining the monthly payment amount and the amount you will owe when the balloon payment comes due.

The final function requires a printer and produces a hard copy amortization table when provided with the necessary loan information. You have the option of either a detailed, month-by-month report or simply a printout of the principal and interest paid in each tax year. The report is very complete and easy to read, and I had no trouble at all producing it on my DMP-130 printer.

All of the features of *Dollar Wise* functioned precisely as described. The documentation is brief, but clear, and makes good use of examples to explain each capability. Most of the inputs required are very self-explanatory, and those that are not are covered adequately in the documentation. Some of the program features use parameters that are subject to significant fluctuation in the real world. The authors do a good job of pointing this out, emphasizing that *Dollar Wise* is not a financial wizard, just one of several tools that can be used in making financial decisions.

There are a few characteristics of *Dollar Wise* that I found rather annoying. For one thing, most of the functions can be repeated without returning to the main menu by making a change to one of the input parameters. It would be nice if the user could change multiple parameters in one pass.

Another minor deficiency is that all times are input in "number of" months or years. The Amortization table, for instance, asks `Number of Payments in first year?` I would rather be asked "In what month was the first payment made?" Similarly, rather than having to request interest paid in "year 3," I would find it easier to ask for interest paid in 1985. However, this does not reduce the accuracy or value of the output.

Dollar Wise comes with a guarantee to load forever, and it will be replaced free of charge if it ever fails to do so for any reason. It is a very useful program for making a lot of financial decisions.

(Prickly-Pear Software, 213 Mirada, El Paso, TX 79932; 915-584-7784. Disk $27.95; Tape $24.95)

— Jim K. Issel

Hint . . .

EDTASM+ Magic

Here is a helpful hint for CoCo 3 owners who also use Disk *EDTASM+*. The 40- and 80-column displays are usable with Disk *EDTASM+*. Just set your screen the way you want it, put the *EDTASM+* disk in the drive and type `RUN"DOS"`. Nothing will appear on the screen when the disk stops, but all you have to do is press 2. After the disk stops again, type `EDTASM` and press ENTER. Again, you will be typing this "blind." When the disk stops again, you will find yourself in *EDTASM+* and with a wider screen. It sure makes those assembly programs easier to read when running in 80-columns!

Jeff Hameluck
Saskatchewan, Canada

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

Assembly Language Programming for the CoCo 3, a book that describes the CoCo 3 enhancements and how to use them with assembly language. This is a continuation of the book *Assembly Language Programming for the TRS-80 Color Computer* by Laurence A. Tepolt. *Tepco, 30 Water Street, Portsmouth, RI 02871; (401) 683-5312. $12 plus $1 S/H*

Calindex II, a 32K program designed to increase the efficiency of an individual or group by automating the use of a calendar for management of schedules. For the CoCo 1, 2 and 3. *Emerson Computer Services Company, 8289 Banner Road SE, Port Orchard, WA 98366; (206) 857-7878. $39.95 plus $3 S/H*

Erina, a debugger for the OS-9 operating system. Includes a mini-assembler and disassembler for the 6809, and tracing and debugging commands. For the CoCo 2 and 3. *Clearbrook Software Group, P.O. Box 8000-499, Sumas, WA 98295; (604) 853-9118. $69 plus $5 S/H*

***Inventory Manager,** a 64K business inventory control and purchase order entry system. For the CoCo 1, 2 and 3. *Forrest Enterprises, 1521 Lancelot, Borger, TX 79007; (806) 274-3083. $25*

OS-9 Character Set Editor, a 512K graphics editor for the modification and creation of the OS-9 character sets. Included are several sample fonts and instructions on how to load and use alternate fonts. For the CoCo 3. *Bob van der Poel Software, 17435-57 Avenue, Edmonton, Alberta, Canada T6M 1E1. $19.95 plus $2 S/H*

QUIKPRO+II, a file maintenance data entry program generator. This program lets you create programs for filing and data handling without knowledge of programming. For the CoCo 1, 2, and 3. *ICR-Futuresoft, 1718 Kingsley Avenue, Orange Park, FL 32607; (904) 269-1918. $29.50 plus $4.50 S/H*

Tax Estimator, an update version for approximating federal tax for the 1987 tax year. For the CoCo 1, 2 and 3. *Try-O-Byte, 1008 Alton Circle, Florence, SC 29501; (803) 662-9500. $6 to cover S/H*

Trig Attack, an educational graphics game that teaches mathematical concepts in 11 levels of play. For the CoCo 1, 2 and 3. *Sugar Software, P.O. Box 7446, Hollywood, FL 33081; (305) 981-1241. $19.95 for 16K CB Tape or 32K ECB Disk*

***First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

16K
ECB

Getting a Fix on Triangles

By Steve Blyn
Rainbow Contributing Editor

This month's program is a review of the major types of triangles. This subject is usually introduced in the seventh or eighth grade. Those illustrated in this program are the equilateral, isosceles, right and scalene triangles.

An eqilateral triangle has three 60-degree angles and three equal sides. An isosceles triangle has two equal sides and two equal angles. A right triangle contains a right angle. A scalene triangle has three dissimilar sides and three nonequal angles.

The program draws, in high resolution, an approximate simulation of one of the four triangles, selected randomly. Press the D key to move the cursor down the list of four names and then press the ENTER key when you believe the picture matches the correct name.

If you are incorrect, a short beep will be heard. You can then continue to guess until the correct response is given. Then a pleasant tune is played and the word `CORRECT` is displayed.

Since there are only four types of triangles to learn here, we hope that all students will master this program in a brief period of time. Therefore, we didn't include any kind of scoring. After each correct response, the user may press the B key to begin again or the E key to end the program.

Students can get additional use out of this program by using a protractor, a semicircular, plastic device used to measure angles. It could be placed up to the screen to measure angles drawn in the triangles illustrated. While not exact, their measurements will be close enough to get across all of the necessary points. Children would then be able to use the program for a different purpose: practice in the measurement of angles. After awhile they should be able to answer the following questions:

1. The sum of the angles of any triangle is always ____?
2. Any triangle containing one 90-degree angle is a ____ triangle?
3. Any triangle with one angle greater than 90 degrees is a ____ triangle?

Along with learning the types of triangles, students also learn about three types of angles: acute (less than 90 degrees), right (exactly 90 degress) and obtuse (more than 90 degrees). A program similar to the one presented here could be written to draw and teach this concept, which could be a follow-up activity of yours or the students.

As students learn more about angles, they can check their understanding by trying to draw on paper and define such exotic triangles as acute scalene, obtuse scalene, acute isosceles, obtuse isosceles, right scalene and right isosceles. Examples of these triangles could also be programmed by you or the students into this or a similar program.

Our program displays its triangles and words in high resolution. A program that is so dependent upon graphics as this one really needs to use one of the available high resolution screens. The letters needed for the words are contained in strings on lines 390 through 580. This method of programming is effective on the CoCo 1 and 2. The CoCo 3 will, of course, also be able to display and run this program properly and is much more versatile. CoCo 3s make programs such as this much easier to write because high resolution with onscreen text is permitted.

The four types of triangles are displayed by lines 40 through 110. Lines 120 through 190 select and draw one of the four types. The dimensions of the triangles drawn are variable within certain limits. We would not want to draw identical triangles during the running of the program. Variety always helps maintain student interest in any program.

For each example, the type of triangle is randomly selected by the variable A. The routine contained in lines 220 through 330 moves the cursor and checks for a match when the ENTER key is pressed. This method can easily be employed in modifications or additions to this program.

We at Computer Island hope that this program helps introduce your youngsters to the world of triangles. □

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: TRIANGLE

```
10 REM"REVIEWING TYPES OF TRIANG
LE"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1987
30 CLEAR 1000:PCLS5:PMODE3,1:SCR
EEN1,1:PCLS5:GOSUB 390
40 DRAW"BM26,5C7A2S8"+T$+Y$+P$+E
$+S$
50 DRAW+SP$+O$+F$+SP$
60 DRAW+T$+R$+I$+A$+N$+G$+L$+E$+
S$
70 COLOR6:LINE(10,3)-(245,19),PS
ET,B:LINE(12,4)-(243,18),PSET,B
80 DRAW"BM180,50S4"+R$+I$+G$+H$+
T$
90 DRAW"BM180,80"+E$+Q$+U$+I$+L$
+A$+T$+E$+R$+A$+L$
100 DRAW"BM180,110"+I$+S$+O$+S$+
C$+E$+L$+E$+S$
110 DRAW"BM180,140"+S$+C$+A$+L$+
E$+N$+E$
120 J=10:K=130:C=20+RND(80):D=20
+RND(20)
130 E=100+RND(50):F=150+RND(50)
140 A=RND(4)
150 IF A=1 THEN E=70+RND(30):F=1
30:C=INT(E/2+.5):REM"ISOSCELES"
160 IF A=2 THEN C=10:F=130:D=20+
RND(50):REM"RIGHT TRIANGLE"
170 IF A=3 THEN J=10:K=100:D=50+
RND(20):E=60+RND(30):F=100:C=INT
((E-10)/2):REM"EQUILATERAL"
180 COLOR8:LINE(J,K)-(C,D),PSET
190 LINE-(E,F),PSET:LINE-(J,K),P
SET
200 FOR T=52 TO 142 STEP 30:CIRC
LE(155,T),5:NEXT T:T=52
210 PAINT(J+2,K-1),6,8
220 AN$=INKEY$
230 IF AN$="D" THEN CIRCLE(155,T
-30),3,5:CIRCLE(155,T),3,8:T=T+3
0:PLAY"O3L200CDEG"
240 IF AN$=CHR$(13) THEN 270
250 IF T>172 THEN T=52:CIRCLE(15
5,142),3,5:CIRCLE(155,172),3,5
260 GOTO 220
270 IF T=82 AND A=2 THEN 340
280 IF T=112 AND A=3 THEN 340
290 IF T=142 AND A=1 THEN 340
300 IF T=172 AND A=4 THEN 340 EL
SE 330
310 IF T>172 THEN 330
320 IF T<82 THEN 330
330 PLAY"O2L100GG":GOTO 220
340 PLAY"O4L100CDEFGGEECC"
350 DRAW"S8BM160,160"+C$+O$+R$+R
$+E$+C$+T$
360 EN$=INKEY$
370 IF EN$="B" THEN RUN ELSE IF
EN$="E" THEN END ELSE 360
380 REM"THESE ARE THE STRINGS FO
R THE LETTERS AND NUMBERS"
390 A$="BEHUNU2R4NU2DGL2BGBL6"
400 C$="BU4ER2FD2GL2HBG2BL4"
410 E$="BER3U2NL2U2L4BG5BL2"
420 F$="BUR4U2NL3U2BG5BL5"
430 G$="BUR4U3HL2GDRBG3BL4"
440 H$="BUU2NU2R4NU2D2BGBL9"
450 I$="BR2BUU4BU2BD7BL8"
460 L$="BU5R4D4BGBL9"
470 N$="BUU4F4U4BG5BL5"
480 O$="BEHU2ER2FD2GL2BGBL6"
490 P$="BER3U2NU2L3GNFBG2BL4"
500 Q$="BEHU2ERNDNURFD2GL2BGBL6"
510 R$="BEHERNH2R2NU2D2L3BGBL6"
520 S$="BU2FR2EHL2HER2FBG4BL6"
530 T$="BUR2NU4R2BDBL10"
540 U$="BUU3ER2FD3BGBL9"
550 Y$="BUE2NU2F2BGBL9"
560 SP$="BE4BUBG5BL5"' ***SPACER
570 RETURN
```

LOTZALUK

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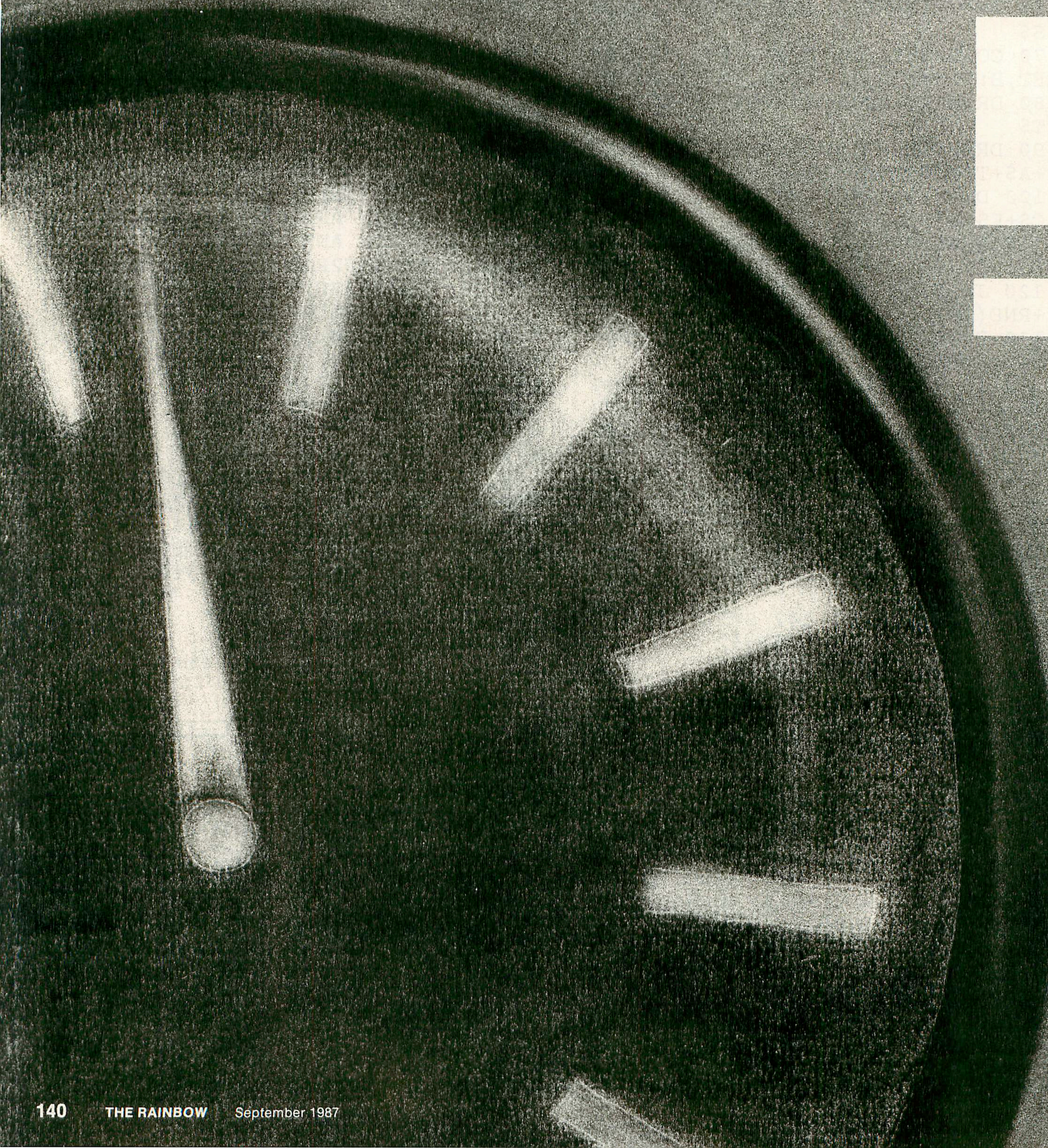

32K
ECB

CoCo Sets the Pace

By Richard D. Gordley

The establishment of a small, private school quickly leads to very imaginative efforts to provide maximum learning experiences with minimum expenditures. Our single CoCo gets very little commercial software, but does provide an immediate proving ground for all the educational programs I can grind out. My wife, who is the reading specialist in this team, requested a tachistoscope program to eliminate the need to purchase one of the commercial reading pacers on the market. Originally, the program was written for tape operation and was later upgraded when we acquired a disk drive. If you intend to use the program on a disk system, the following changes need to be made:

Line 4010 change `INPUT` to `LINEINPUT`
Line 4030 change `INPUT` to `LINEINPUT`
Line 4040 change `INPUT` to `LINEINPUT`

Richard Gordley and his wife, Nancy, operate the Chillicothe Alternative School in Chillicothe, Illinois. Richard has a degree in Music Education, and his hobbies include leathercraft, computing and wind instrument repair.

The algorithm to provide a moving text window with variable speed was easy, but the rest of this program has been revised while in use for the last six months. Believe me, I now have a healthy respect for commercial programmers!

Most tachistoscopes on the market allow you to use the machine on printed material right off the page. Since, by nature, computers must read files in order to do anything similar, we decided to take advantage of this apparent drawback to introduce immediate comprehension testing in the body of the text in the form of multiple-choice questions. Consequently, the assumption is that the users of *Tachisto* will be able to select appropriate level texts for their students and also formulate questions that test comprehension at the level consonant with the reading level of the text.

At the core of *Tachisto* is a variable-speed, moving window tachistoscope that should increase reading speed, improve tracking ability, reinforce comprehension skills and provide a printed report for the instructor's benefit. Surrounding this is an environment of input, editing and file copying. *Tachisto* includes user instructions and a main and secondary menu, and it is as user-proof as possible. (I have found that there is no such thing as a program that is completely "user-proof," especially for grade school students, but the many requests for Yes/No responses during the program run, combined with an immediate editing feature, comes very close.)

Initially, the program asks if you want instructions that apply mainly to the preparation of text files. This is the area in which the most errors are encountered, since the student-use section is almost foolproof. All other functions of the program have been made self-prompting.

The most difficult part of using *Tachisto* is breaking up text into 10 segments of 255 characters each. Some care must also be used in order to avoid line breaks. The instructor may also want to include four to eight spaces at the end of each text excerpt to prevent exit from the tachistoscope at a more rapid rate than that selected, because of the `MID$` heart of the program. One specification not included in the instructions is that because of the way CoCo stores files, quotation marks (") *cannot* be used in the text excerpts. Option 5 should be used with care since it only provides a more elegant alternative to `BREAK`. Premature exit from the program may be remedied without loss of data by typing `GOTO 110`.

To use a lesson, you must enter the filename of the required text and the student's name, as well as the tachistoscope speed. The tachistoscope algorithm is found in lines 1120 to 1200, where you can see that the delay factor simply makes the computer count between movements of the window. Thus, the fastest available speed is 0 and the slowest is unlimited. After selection of the reading speed, the program presents a preview and allows adjustment if the initially chosen speed is unsuitable.

At this point in the program, when the text and speed have been chosen, the printer begins to record the performance of the student. Each text excerpt is followed by a multiple-choice question with three options. The student then follows the prompts. At this point, there is a secret option for the teacher who is monitoring the student's progress. If the instructor so desires, pressing the right arrow key will display the entire text of the preceding excerpt in order to review the text.

Pressing any key will then return to the multiple-choice question. Missing a question leads to a re-running of the text until a correct response is received. At the end of each session, if the student has scored 70 percent or less, the lesson begins again. For the convenience of the instructor, the questions that are answered incorrectly are printed out on the printer. (This feature helps detect fuzzy questions embedded in the file as well as indicating what comprehension problems exist in the student.)

If you want to edit or copy a file from disk or tape to either medium, the program prompts the manipulation of the media and returns to the main menu when finished. Editing of a file before recording is also presented and prompted one step at a time.

Tachisto could be improved. This program on disk could be made to read and record texts used by each student and advance them automatically. This would involve the incorporation of a calling program, which was altered by the *Tachisto* program through the use of `DSKO$` and `DSKI$`. More imaginative reward messages could be used. Use of the speed-up poke could make the window move much faster if care were taken to un-poke this before any I/O processes. The text window could be made larger or smaller, or each line of text could be "flashed" instead of "tracked." Since our school only deals with kindergarten through eighth grade students, the current parameters are satisfactory. I would welcome any efficiencies or enhancements from readers.

Since there is such a huge time factor involved in creating text files for this program, I will trade text files usable with *Tachisto* on a one-for-one basis. Chillicothe Alternative School, Inc., a non-profit organization, accepts tax-deductible donations of any CoCo hard- or software in order to further our work with exceptional children.

(Questions about this program may be addressed to the author at Box 28, Castleton, IL 61426. Be sure to include an SASE when writing for a reply.) ☐

Editor's Note: A sample data file, `PUDDING`, *immediately follows the* `TACHISTO` *program on this month's RAINBOW ON TAPE and RAINBOW ON DISK.*

70	225	2020	214
103	149	3020	100
170	89	3180	154
310	63	3320	72
900	94	3540	151
1121	80	3710	213
1230	143	4050	23
1330	105	END	124

The listing: `TACHISTO`

```
1 'TACHISTOSCOPE
2 'COPYRIGHT AUGUST 1985
3 'RICHARD D. GORDLEY
4 'BOX 28
5 'CASTLETON IL 61426
10 CLEAR5000:CLS0:DIMTE$(10),Q1$
(10),A1(10),A1$(10,3)
12 WR$="T255L255CGCGCGCGCGCGCGCG
CGCG"
13 RI$="T4L8CFCFCF"
14 SC=0:PR=32
15 TS$="HERE IS HOW THE TEXT WIL
L APPEARWHEN TACHISTOSCOPE IS RU
NNING.  CAN YOU READ THIS EASILY
 OR      SHOULD THE SPEED BE CHAN
GED?"
20 FORX=1TO3:PRINT@137,"TACHISTO
SCOPE";:FORZ=1TO250:NEXT:FORY=1T
O13:PRINT@136+Y,CHR$(128);:FORZ=
1TO50:NEXTZ,Y:SOUND100,1:NEXTX
30 PRINT@137,"TACHISTOSCOPE";:PR
INT@270,"(C)";:PRINT@327,"RICHAR
D D. GORDLEY";:PRINT@398,"1985";
40 FORX=1TO1000:NEXT
50 CLS:PRINT@9,"tachistoscope";:
PRINT@96,"DO YOU WISH INSTRUCTIO
NS? (Y/N)";
60 GOSUB10000
70 IFI$="N"THEN110
80 CLS:PRINT"USING THIS TACHISTO
SCOPE PROGRAMYOU MAY PREPARE TEX
T AND       QUESTIONS TO BE USE
D BY STUDENTSOR YOU MAY LOAD A P
REVIOUSLY    PREPARED TEXT FOR S
TUDENT USE.":GOSUB10030
90 CLS:PRINT"THE PREPARATION PHA
SE OF THE     PROGRAM IS SELF-PRO
MPTING WITH   ONE EXCEPTION--THE
LENGTH OF THETEXT EXCERPTS IS LI
MITED TO 255 CHARACTERS."
95 PRINT"AT THIS POINT THE COMPU
TER WILL REFUSE TO ACCEPT FURTHE
R INPUT. YOU SHOULD PLAN YOUR TE
XT       EXCERPTS ACCORDINGLY.":
GOSUB10030
97 CLS:PRINT"REMEMBER THAT THE B
EGINNING OF   THE TEXT WILL ALSO
INDICATE      WHERE THE LINE BREA
KS WILL       OCCUR.  YOU SHOULD
FORMAT YOUR   TEXT ACCORDINGLY.":
GOSUB10030
100 CLS:PRINT"ALL STUDENT QUESTI
ONS WILL BE INTHREE-OPTION MULTI
PLE CHOICE      FORMAT.  OPTIONS S
HOULD BE      LIMITED TO ONE WOR
```

```
D. YOU WILL  THEN BE ASKED TO I
NDICATE THE   CORRECT ANSWER by
number.":GOSUB10030
103 CLS:PRINT"PREMATURE EXIT FRO
M THE PROGRAM MAY BE REMEDIED WI
THOUT LOSS OF TEXT BY TYPING 'GO
TO 110'":GOSUB10030
109 I$=""
110 CLS:PRINT@12,"main menu";
120 PRINT:PRINT"DO YOU WISH TO:"
:PRINT:PRINT"   (1) PREPARE A LE
SSON":PRINT:PRINT"   (2) USE A L
ESSON":PRINT:PRINT"   (3) COPY A
 FILE":PRINT:PRINT"   (4) EDIT A
 FILE":PRINT:PRINT"   (5) EXIT P
ROGRAM":PRINT@448,"PRESS NUMBER
OF YOU CHOICE.";
130 I$=INKEY$:IFI$=""THEN130
131 I=VAL(I$):IFI<1ORI>5THENPLAY
WR$:GOTO130
140 ONI GOTO150,900,2000,3000,60
00
150 CLS:PRINT"preparation-lesson
 input";
151 PRINT:PRINT"WILL THE LESSON
BE SAVED ON        <D>ISK OR <T>APE
?"
152 I$=INKEY$:IFI$=""THEN152
153 IFI$="D" THEN159ELSEIFI$="T"
 THEN160ELSE152
159 DE=1:PRINT:PRINT"POSITION DI
SK IN DRIVE.":GOSUB10030:GOTO170
160 DE=-1:PRINT:PRINT"POSITION T
APE IN RECORDER AND   PREPARE TO
 record":GOSUB10030
170 CLS:PRINT@160,"";:INPUT"FILE
NAME OF THIS LESSON        (8 L
ETTERS OR LESS)";FI$:PRINT@288,"
FILE WILL BE NAMED "FI$:PRINT:PR
INT"IS THIS CORRECT? (Y/N)":GOSU
B10000
171 IFI$="N"THEN170
172 CLS:PRINT@160,"INPUT TITLE O
F LESSON.":PRINT:INPUT TI$
174 CLS:PRINT"LESSON WILL BE TIT
LED:":PRINTTI$:GOSUB9999
176 IFI$="N"THEN172
200 FORX=1TO10
210 CLS:LINEINPUT"TEXT: ";TE$(X)
220 CLS:PRINT"here is excerpt no
."X
230 PRINT:PRINTTE$(X):GOSUB9999
240 IFI$="N"THEN210
250 CLS:PRINT"INPUT QUESTION "X:
LINEINPUT Q1$(X)
260 CLS:PRINT"QUESTION "X" IS":P
RINT:PRINTQ1$(X):GOSUB9999
270 IFI$="N" THEN250
```

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```
280 CLS:PRINT"INPUT ANSWER CHOIC
ES"
290 FORY=1TO3
300 PRINT:PRINT:PRINT Y:INPUTA1$
(X,Y)
310 NEXTY
320 CLS:PRINT"QUESTION "X:PRINT:
PRINT"POSSIBLE CHOICES:":FORY=1T
O3:PRINTA1$(X,Y):NEXTY:GOSUB9999
330 IFI$="N"THEN280
340 CLS:PRINT"INPUT NUMBER OF CO
RRECT CHOICE FOR QUESTION" X:PRI
NT:PRINT:INPUT A1(X):PRINT"CORRE
CT ANSWER TO QUESTION "X" IS "A1
(X):GOSUB9999
350 IFI$="N"THEN340
360 CLS:PRINT"EXCERPT NO. "X" CO
MPLETE.":SOUND 100,5:FORTI=1TO50
0:NEXTTI:NEXTX
361 CLS:SOUND100,10:PRINT"WOULD
YOU LIKE TO EDIT ANY OF   THIS E
XERCISE (Y/N)?             note:
IF YOU DO NOT EDIT,        RECORD
ING BEGINS AT ONCE!":GOSUB10000
362 IFI$="Y" THEN3140
370 IFDE=-1THENGOSUB5000ELSEGOSU
B6100
380 PRINT#-1,TE$(X)
385 PRINT#-1,Q1$(X)
390 FORY=1TO3:PRINT#-1,A1$(X,Y):
NEXT
430 IFDE=-1THENCLS:PRINT"DO YOU
WISH TO RECORD ANOTHER   COPY TO
 TAPE?  (Y/N)":GOSUB10000ELSE440
435 IFI$="Y" THENGOSUB5000
440 GOTO110
900 I$="":CLS:PRINT"student use
section":PRINT:PRINT"IS FILE ALR
EADY IN MEMORY (HAVE YOU JUST CR
EATED IT OR LOADED ITTO EDIT OR
COPY) (Y/N)?":GOSUB10000
910 IFI$="Y" THEN1121
950 CLS:PRINT:PRINT"WILL YOU REA
D FILE FROM <D>ISK  OR <T>APE?"
955 I$=INKEY$:IFI$=""THEN955
960 IFI$="D" THEN970ELSEIFI$="T"
THEN1000ELSE955
970 DV=1:CLS:PRINT:PRINT"student
 use section":PRINT"MAKE SURE FI
LE DISK IS IN DRIVE.":PRINT:PRIN
T"PREPARE PRINTER AND SET TO
  1200 BAUD.":GOSUB10030:GOTO102
0
1000 DV=-1:CLS:PRINT"student use
 section":PRINT:PRINT"PLACE FILE
 TAPE IN RECORDER AND PREPARE RE
CORDER TO play":PRINT:PRINT"PREP
ARE PRINTER AND SET TO 1200 BAUD
```

```
":GOSUB10030
1020 CLS:INPUT"FILENAME OF LESSO
N";FI$
1030 PRINT:PRINT"LESSON "FI$:PRI
NT" WILL BE PREPARED.":GOSUB9999
1031 IFI$="N" THEN1020
1050 GOSUB4000
1121 CLS:INPUT"PLEASE ENTER DELA
Y FACTOR FOR  TACHISTOSCOPE SPE
ED.";DL:SOUND100,1
1122 PR=32:CLS0:FORY=1TOLEN(TS$)
:PRINT@PR,MID$(TS$,Y,1);:PRINT@P
R-8,CHR$(128);:PR=PR+1
1123 FORTM=1TODL:NEXT:NEXT
1124 CLS:PRINT"IS THIS DELAY FAC
TOR CORRECT       (Y/N)?":GOSUB1000
0
1125 IFI$="N" THEN1121
1127 CLS:INPUT"STUDENT'S NAME";N
M$
1128 POKE149,0:POKE150,41
1129 PRINT#-2,NM$,FI$,DL;CHR$(13
)
1130 CLS0:PRINT@192,TI$;:FORX=1T
O2000:NEXT
1132 GOSUB10030
1140 FORX=1TO10
1145 CLS0
1150 PR=32
1160 FORY=1TOLEN(TE$(X))
1170 PRINT@PR,MID$(TE$(X),Y,1);
1180 PRINT@PR-8,CHR$(128);
1190 PR=PR+1
1200 FORTM=1TODL:NEXT
1210 NEXTY
1220 CLS:PRINTQ1$(X):PRINT:FORY=
1TO3:PRINTY") ":PRINTA1$(X,Y):NE
XTY
1230 PRINT:PRINT"PRESS NUMBER OF
 YOUR CHOICE"
1240 I$=INKEY$:IFI$=""THEN1240
1245 IFASC(I$)=9 THENCLS:PRINTTE
$(X):GOSUB10030:GOTO1220
1250 I=VAL(I$):IFI<1ORI>3THENPLA
YWR$:GOTO1240
1260 IFI<>A1(X) THENGOSUB9000:SO
UND5,5:CLS:PRINT@224,"INCORRECT-
-TRY AGAIN":FORQ=1TO1500:NEXT:PR
INT#-2,Q1$(X),:GOTO1145
1270 CLS0:PRINT@235,"RIGHT!!";:P
LAYRI$
1280 NEXTX
1285 PRINT#-2,CHR$(13)
1290 SOUND100,5:CLS:PRINTNM$",":
PRINT:PRINT"YOU GOT "(10-SC)*10"
% CORRECT.":IFSC=>3THENPRINT"BET
```

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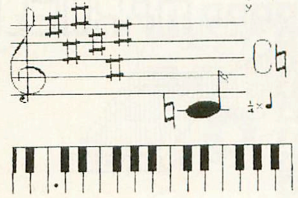
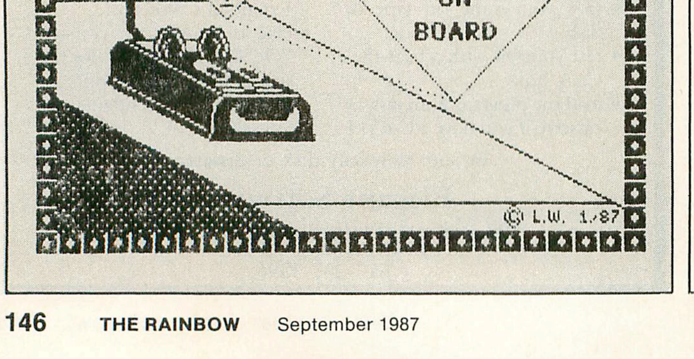


Be sure to specify **disk** or **cassette.**

Elegant Software
89 Massachusetts Avenue, Box 251
Boston, MA 02115
617-232-3896

```
TER TRY IT ONCE MORE.":GOSUB10003
0:SC=0:GOTO1130
1300 IFSC=0THENPRINT"PERFECT JOB
!!"ELSEIFSC=1THENPRINT"VERY GOOD
 WORK!"ELSEIFSC=2THENPRINT"NOT B
AD, KEEP TRYING!"
1305 FORX=1TO3000:NEXT
1310 SC=0:CLS:PRINT"DO YOU WISH
TO USE THIS LESSON  WITH ANOTHER
 STUDENT  (Y/N)?":GOSUB10000
1320 IFI$="N" THENGOTO110
1330 CLS:PRINT:PRINT:INPUT"STUDE
NT NAME";NM$:PRINT:INPUT"DELAY F
ACTOR";DL
1331 PR=32:CLS0:FORY=1TOLEN(TS$)
:PRINT@PR,MID$(TS$,Y,1);:PRINT@P
R-8,CHR$(128);:PR=PR+1
1332 FORTM=1TODL:NEXT
1333 NEXT
1334 CLS:PRINT"IS THIS DELAY FAC
TOR CORRECT      (Y/N)?":GOSUB1000
0
1335 IFI$="N" THEN1330
1340 PRINT#-2,NM$,FI$,DL;CHR$(13
)
1350 GOTO1130
2000 CLS:PRINT"file copy mode":P
RINT:PRINT:INPUT"NAME OF FILE TO
 COPY";FI$
2001 PRINT"WILL YOU READ FILE FR
OM <D>ISK  OR <T>APE?"
2002 I$=INKEY$:IFI$=""THEN2002
2003 IFI$="T"THEN2005ELSEIFI$<>"
D"THEN2002
2004 DV=1:CLS:PRINT"PLACE DISK C
ONTAINING"FI$:PRINT"IN DRIVE.":G
OSUB10030:GOTO2010
2005 DV=-1:CLS:PRINT"PLACE TAPE
CONTAINING "FI$:PRINT" IN RECORD
ER AND PREPARE TO PLAY":GOSUB100
```



```
30
2010 GOSUB4000
2020 SOUND100,5:CLS:PRINT"WILL Y
OU COPY THIS FILE TO      <D>ISK
 OR <T>APE?"
2025 I$=""
2030 I$=INKEY$:IFI$=""THEN2030
2040 IFI$="T"THENDE=-1ELSEIFI$="
D" THENDE=1:GOTO2109ELSE2030
2100 IFDE=-1THENCLS:PRINT"PLACE
TAPE TO RECEIVE DUPLICATE "FI$:P
RINT" IN RECORDER AND PREPARE TO
      record":GOSUB10030
2109 IFDE=1THENCLS:PRINT"PLACE D
ISK TO RECEIVE DUPLICATE":PRINTF
I$:PRINT"IN DRIVE.":GOSUB10030
2110 IFDE=-1THENGOSUB5000ELSEGOS
UB6100
2195 CLS:PRINT"DO YOU WISH ANOTH
ER COPY (Y/N)?":GOSUB10000
2196 IFI$="Y" THEN2020
2200 GOTO110
3000 CLS:PRINT"edit prerecorded
file"
3002 PRINT:PRINT"WILL YOU READ F
ILE FROM <D>ISK  OR <T>APE?"
3004 I$=INKEY$:IFI$=""THEN3004
3006 IFI$="D" THENDV=1 ELSEIFI$=
"T" THENDV=-1 ELSE3004
3010 CLS:PRINT:PRINT:INPUT"FILEN
AME OF DESIRED FILE";FI$
3020 PRINT:PRINT"FILE "FI$:PRINT
"WILL BE PREPARED":GOSUB9999
3030 IFI$="N" THEN3010
3031 IFDV=-1 THEN3034
3032 CLS:PRINT"PLACE DISK CONTAI
NING":PRINTFI$:PRINT"IN DRIVE.":
GOSUB10030:GOTO3040
3034 PRINT"PLACE TAPE CONTAINING
":PRINTFI$:PRINT"IF RECORDER AND
 PREPARE TO play.":GOSUB10030
3040 CLS:PRINT"SEARCHING FOR "FI
$
3050 GOSUB4000
3140 CLS:PRINT"file edit mode":P
RINT:PRINT"(1) CHANGE FILE NAME"
:PRINT"(2) CHANGE EXCERPT TITLE"
:PRINT"(3) CHANGE A TEXT":PRINT"
(4) CHANGE A QUESTION":PRINT"(5)
 CHANGE ANSWER CHOICE"
3145 PRINT"(6) CHANGE CORRECT AN
SWER":PRINT"(7) RECORD EDITED FI
LE":PRINT"(8) RETURN TO MAIN MEN
U (aborts
  edit)"
3147 PRINT@448,"PRESS NUMBER OF
YOUR CHOICE"
3150 I$=INKEY$:IFI$=""THEN3150
```

Sugar Software

NEW ☞ OS9 PATCHER ☜ - (C) This is a useful utility for your OS9 Level I or II system. It allows you to modify the contents of a file or memory module using easy to understand commands. Data may be displayed and entered in either decimal, hexadecimal, octal or ascii characters. Module CRCs calculated and patched automatically. Patch command files may be used as input to the Patcher and patch command files can be generated from an original and already patched file. Disk only; OS9 Level I or II; **$19.95**.

CALLIGRAPHER

CoCo Calligrapher - (Hybrid BASIC/ML) Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes 3 fonts: *Gay Nineties, Old English* and *Cartoon*. The letters are ½ inch high and variably spaced. Works with many printers including Epson, Gemini, Radio Shack, Okidata 92A, Banana and Prowriter. Additional fonts are available (see below). Tape/Disk; **$24.95**.

OS9 Calligrapher - (C) Although a different program from the CoCo Calligrapher, the OS9 Calligrapher prints all the same fonts. It reads a standard text file which contains text and formatting directives. You may specify the font to use, change fonts at any time, centering left, right or full justification, line fill, margin, line width, page size, page break and indentation. Similar to *troff* on UNIXTM systems. Includes Gay Nineties, Old English and Cartoon fonts. Additional fonts are available (see below). Disk only; OS9 Level I or II; **$24.95**.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk; specify RSDOS or OS9 version; **$14.95** each. **Set #1** - (9 fonts) Reduced, reversed and reduced-reversed versions of Gay Nineties, Old English and Cartoon; **Set #2** - (8 fonts) Old Style and Broadway; **Set #3** - (8 fonts) Antique and Business; **Set #4** - (8 fonts) Wild West and Checkers; **Set #5** - (10 fonts) Stars, Hebrew and Victorian; **Set #6** - (8 fonts) Block and Computer;

Economy Font Packages on disk; specify RSDOS or OS9; **29.95**: **Font Package #1** - Above font sets 1, 2 and 3 (25 fonts) on one disk. **Font Package #2** - Above font sets 4, 5 and 6 (26 fonts) on one disk. Both Packages #1 and #2 (51 fonts) on one disk; **49.95**. ☜ NEW

NEW ☞ **Calligrapher Combo** Package - *Everything!*; specify RSDOS or OS9; Includes the Calligrapher and both Font Packages on one disk; **$69.95**.

UTILITIES

Piratector - (100% ML) Utility to allow your own *disk-based* BASIC or ML programs to display a graphics title screen and then self-start after loading. Adds copy protection to your programs but still allows users to create *non-executable* backups! Includes Semigraf. Disk only; CoCo 1, 2, 3 (except Semigraf); **$39.95**.

Super Screen Machine - (100% ML) Put your CoCo into high resolution mode for your own BASIC or ML programs. Smooth scroll, key click, lower case with colored characters. Tape/Disk; 32K CB; CoCo 1, 2, 3 (except 64K mode); **$19.95**.

Color Disk Manager - (100% ML) Disk utility with these features: Disk repair, selective track initialization, verify sectors, backups, tape to disk transfer, ROM Pak execution from disk, much more! Tape/Disk; CoCo 1, 2, 3 (except for 64K mode); **$24.95**.

Color Tape Manager - (100% ML) Tape utility with these features: display start, end and exec address of ML programs, convert ML programs into BASIC *DATA* statements, append ML to BASIC, load, display/modify and save tape file, handles missing EOF and filename blocks, much more! Tape/Disk; 16K ECB; CoCo 1, 2, 3 (except for 64K mode); **$19.95**.

INFORMATION MGT.

TIMS (The Information Management System) - (Hybrid BASIC/ML) Tape or disk, fast and simple general data base program. Create *files* of *records* that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Up to 8 *user* fields, sort on up to 3 fields. Tape/Disk; **$19.95** (see combo pkg below).

TIMS Mail - (Hybrid BASIC/ML) Tape or Disk based mailing list management program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2½ to 4 inches wide. Tape/Disk; **$19.95** (see combo pkg below).

TIMS Utility - (Hybrid BASIC/ML) Utility companion for TIMS and TIMS Mail to allow multi-term search (*AND* and *OR* logic), global change and delete, split large files and more! Tape/Disk; **$14.95** (see combo pkg below).

TIMS Combo Package - All three of the above programs: TIMS, TIMS Mail and TIMS Utility on one disk - **$34.95**.

SPORTS STATISTICS

Statistics programs for the coach, team manager or avid fan who wants to keep accurate team and opponent records. Printer output supported. The following are available: Baseball, Basketball, Football and Soccer. Disk only; **$19.95** each.

EDUCATIONAL

NEW ☞ **Trig Attack** - (100% ML) In this educational arcade game, enemy *trigs* travel along math curves. Players learn important mathematical concepts as they play. Trig Attack is filled with sound effects, colorful graphics and features 11 challenging levels. First class mathematical entertainment for ages 9 and up. Excellent manual includes an introduction to trigonometry. Tape 16K CB/Disk 32K ECB; CoCo 1, 2, 3; **$19.95**.

A complete catalog of other sweet Sugar Software products is available.

Silly Syntax - (Hybrid BASIC/ML) Ages 5 and up. Story creation game; output to screen or printer; includes 2 stories or create your own. Tape/Disk; **$19.95** or disk with 62 stories for **$29.95**. Sets of 10 stories on tape/disk for **$4.95**: Fairy Tales, Current Events, X-Rated, Sing-Along, Adventure, Potpourri.

Bible Stories Adventure - (Hybrid BASIC/ML) Ages 4 & up. A graphics adventure game for young children & their families. Old testament. Tape/Disk; **$19.95**.

The Presidents of the USA - (100% ML) Ages 10 and up. Two trivia games, user modifiable, printer output supported. Tape/Disk; 16K ECB; **$19.95**.

The Great USA - Ages 9 and up. Trivia game of the 50 states. Capitals, nicknames, abbreviations, flowers, trees and birds. Tape/Disk; 16K ECB; **$19.95**.

Galactic Hangman - Ages 7 and up. Exciting new twist to the popular word game. Outstanding graphics; 700 word vocabulary. Tape/Disk; 16K ECB; **$19.95**.

PreReader - (Hybrid BASIC/ML) Ages 3-5 (level I); Ages 5-7 (level 2); Great graphics and music. Level 1: match colors, shapes, letters and numbers; Level 2: match letters and consonant blends with their sounds. Tape/Disk; Joystick; **$19.95**.

Statgraf - High school and college level; Linear regression analysis program combined with a plotting and line graphing system. Up to 250 x/y pairs; data transformation; residuals; regression line; print graph with screen print program (not supplied); Tape/Disk; **$19.95**.

SPECIAL INTEREST

Rental Property Income and Expense Management Package - Maintain your rental property income and expense records. Print output supported. 28 expense categories. *This program may be tax deductible.* Disk only; **$29.95**.

Radio Systems Design Calculations - Performs 14 different calculations commonly used in design or evaluation of land mobile radio systems, satellite TV, etc. Tape/Disk; **$19.95**.

CoCo Knitter - Easy to use program to display or print instructions to knit a sweater: Cardigan or Pullover; Round or V-neck; Raglan or Set-in Sleeve; 3 weights or yarn; 8 sizes from baby to man. Tape/Disk; **$19.95**.

Flying Tigers - (100% ML) Fast *Defenders* style arcade game. 5 levels of difficulty; Outstanding graphics and sound effects. Tape/Disk; Joystick; **$19.95**.

RAINBOW CERTIFICATION SEAL

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All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add $1.50 per tape or disk for postage and handling. Florida residents add 5% sales tax. COD orders add $4. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

```
3160 I=VAL(I$):IFI<1ORI>8THENPLA
YWR$:GOTO3140
3170 ONI GOSUB3180,3200,3250,337
0,3500,3750,3900,110
3175 GOTO3140
3180 CLS:PRINT"change file name"
:PRINT:PRINT:PRINT"CURRENT FILE
NAME IS":PRINTFI$:PRINT:INPUT"NE
W FILE NAME";FI$
3181 GOSUB9999
3182 IFI$="N" THEN3180
3190 RETURN
3200 CLS:PRINT"change excerpt ti
tle":PRINT:PRINT:PRINT"CURRENT T
ITLE IS":PRINTTI$
3210 PRINT:PRINT:INPUT"NEW TITLE
";TI$
3220 GOSUB9999
3230 IFI$="N" THEN3200
3240 RETURN
3250 CLS:PRINT"change text":PRIN
T:PRINT"TEXT WILL BE DISPLAYED O
NE BLOCKAT A TIME. TO EDIT FOLLO
W THE    PROMPTS AT THE BOTTOM OF
 THE    SCREEN.":GOSUB10030
3260 FORX=1TO10
3270 CLS:PRINTTE$(X)
3280 PRINT@448,"(E)DIT OR (C)ONT
INUE?";
3290 I$=INKEY$:IFI$="" THEN3290
3300 IFI$<>"E" ANDI$<>"C" THENPL
AYWR$:GOTO3280
3310 IFI$="C" THEN3350
3320 CLS:PRINTTE$(X):PRINT:PRINT
:LINEINPUT"NEW TEXT ? ";TE$(X)
3330 CLS:PRINTTE$(X):GOSUB9999
3340 IFI$="N" THEN3270
3350 NEXT
3360 RETURN
3370 CLS:PRINT"change question":
PRINT:PRINT"QUESTIONS WILL BE DI
SPLAYED ONE AT A TIME. FOLLOW PR
OMPTS TO    EDIT.":GOSUB10030
3380 FORX=1TO10
3390 CLS:PRINTQ1$(X)
3400 PRINT@448,"(E)DIT OR (C)ONT
INUE?";
3410 I$=INKEY$:IFI$=""THEN3410
3420 IFI$<>"E" ANDI$<>"C" THENPL
AYWR$:GOTO3400
3430 IFI$="C" THEN3470
3440 CLS:PRINTQ1$(X):PRINT:PRINT
:LINEINPUT"NEW QUESTION ? ";Q1$(
X)
3450 CLS:PRINTQ1$(X):GOSUB9999
3460 IFI$="N" THEN3390
3470 NEXT
3480 RETURN
3500 CLS:PRINT"change answer cho
ice":PRINT:PRINT"QUESTIONS AND A
NSWER CHOICES     WILL BE DISPLAY
ED.      FOLLOW PROMPTS
TO EDIT.":GOSUB10030
3510 FORX=1TO10
3520 CLS:PRINTQ1$(X):PRINT
3530 FORY=1TO3
3540 PRINTY")":PRINTA1$(X,Y):NEX
TY
3550 PRINT@448,"(E)DIT OR (C)ONT
INUE?";
3560 I$=INKEY$:IFI$=""THEN3560
3570 IFI$<>"E" ANDI$<>"C" THENPL
AYWR$:GOTO3550
3580 IFI$="C" THEN3710
3590 CLS:FORY=1TO3:PRINTY:PRINTA
1$(X,Y):NEXTY
3600 PRINT:PRINT"CHANGE WHICH AN
SWER?"
3610 I$=INKEY$:IFI$="" THEN3610
3620 I=VAL(I$):IFI<1ORI>3THENPLA
YWR$:GOTO3590
3630 LINEINPUT"NEW ANSWER ? ";A1
$(X,I):GOSUB9999
3640 IFI$="N" THEN3590
3650 CLS:PRINTQ1$(X):FORY=1TO3:P
RINTY")":PRINTA1$(X,Y):NEXTY
3660 PRINT@448,"(E)DIT FURTHER O
R (C)ONTINUE?";
3670 I$=INKEY$:IFI$=""THEN3670
3680 IFI$<>"E" ANDI$<>"C" THENPL
AYWR$:GOTO3660
3690 IFI$="C" THEN3710
3700 GOTO3590
3710 NEXT
3720 RETURN
3750 CLS:PRINT"change correct an
swer number":PRINT:PRINT"QUESTIO
NS, ANSWERS, AND THE     CURRENT
 CORRECT CHOICE WILL BE  DISPLAY
ED ONE QUESTION AT A TIME--FOLLO
W PROMPTS TO EDIT.":GOSUB10030
3760 FORX=1TO10
3762 CLS:PRINTQ1$(X):FORY=1TO3:P
RINTY:PRINTA1$(X,Y):NEXTY
3770 PRINT"ANSWER NUMBER"X" IS"A
1(X)
3780 PRINT@448,"(E)DIT OR (C)ONT
INUE?";
3790 I$=INKEY$:IFI$="" THEN3790
3800 IFI$<>"C" ANDI$<>"E" THENPL
AYWR$:GOTO3780
3810 IFI$="C" THEN3850
3820 CLS:INPUT"NEW CORRECT ANSWE
R";A1(X)
3830 GOSUB9999
3840 IFI$="N" THEN3762
```

```
3850 NEXT
3860 RETURN
3900 IFDV=1THENCLS:PRINT"IF RECO
RDING NEW FILE ON SAME    DISK AS
 OLD FILE, FILE NAME      SHOULD
BE CHANGED":PRINT:PRINT"OKAY TO
BEGIN RECORDING (Y/N)?":GOSUB100
00:IFI$="N" THENRETURN
3910 GOTO151
4000 OPEN"I",#DV,FI$
4010 INPUT#DV,TI$
4020 FORX=1TO10
4030 INPUT#DV,TE$(X),Q1$(X)
4040 FORY=1TO3:INPUT#DV,A1$(X,Y)
4050 NEXTY
4060 INPUT#DV,A1(X)
4070 NEXTX
4080 CLOSE#DV
4090 RETURN
5000 OPEN"O",#DE,FI$
5010 PRINT#DE,TI$
5020 FORX=1TO10
5030 PRINT#DE,TE$(X)
5040 PRINT#DE,Q1$(X)
5050 FORY=1TO3:PRINT#DE,A1$(X,Y)
:NEXT
5060 PRINT#DE,A1(X)
5070 NEXTX
5080 CLOSE#DE
5090 RETURN
6000 END
6100 OPEN"O",#DE,FI$
6110 WRITE#DE,TI$
6120 FORX=1TO10
6130 WRITE#DE,TE$(X)
6140 WRITE#DE,Q1$(X)
6150 FORY=1TO3:WRITE#DE,A1$(X,Y)
:NEXT
6160 WRITE#DE,A1(X)
6170 NEXTX
6180 CLOSE#DE
6190 RETURN
9000 SC=SC+1
9010 RETURN
9999 PRINT@448,"IS THIS CORRECT?
 (Y/N)";
10000 I$=INKEY$:IFI$=""THEN10000
10010 IFI$<>"Y" ANDI$<>"N" THENP
LAYWR$:GOTO10000
10020 RETURN
10030 PRINT@448,"PRESS ANY KEY T
O CONTINUE";:EXEC44539:RETURN
```

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Building an EPROM Emulator

By Tony DiStefano
Rainbow Contributing Editor

A little while ago, I had to develop some software that would run in an EPROM in the CoCo. So, I took out my EPROM programmer and a few blank EPROMs and started to work. Soon after, I ran out of blank EPROMs and had to wait for my eraser to do its work. What a drag.

I started thinking that there must be something I could do about this. The easiest way to solve my problem was to buy a whole lot of EPROMs. It was a quick solution, but the problem was only delayed. And it was also costly. I sat and thought about it for a while, then came up with this idea. Why not build something that would take the place of an EPROM and not take so long to erase?

I had to make some type of RAM that looked and programmed just like an EPROM. RAM does not need to be erased. You just have to write over the top of it and, bang, it is done. If you have a choice of programming times (or can get into the program to change it), you can save a lot of time programming the emulator, too. While it takes time to program an EPROM, you can do an EPROM emulator in no time flat.

What about this chip? It shouldn't be too hard to do these days, with the amount of memory chips available. So I looked into my favorite memory reference manual for some ideas. The EPROM I wanted to emulate was the 2764. I use them a lot and they are quite popular. The 2764 is an 8K-by-8 EPROM in a 28-pin package. I had to find the closest match possible.

After looking through the memory manual, I found an almost perfect chip. It is an 8K-by-8 Static RAM chip in a 28-pin package. I couldn't have come closer if I'd designed it myself. Next, I needed to find some pins that matched. I looked up the pinout for the 2764, compared the two and, presto, found an almost pin-for-pin match. What is this mystery chip? It's a 6264. Many companies make it, and it's not expensive.

That is the first part. But what about retention? As soon as you power down static RAM, you have no more memory. Now you need a battery (a small coin-size battery will do) and a little bit of support circuitry.

Figure 1 shows a diagram for an EPROM emulator. It takes an 8K RAM chip and a battery and turns it into an EPROM. The circuit is quite simple, but still needs some explanation. Also the construction of this is a bit tricky. I will start with the circuit and finish with construction tips.

But first, you must remember that you are working with CMOS memory chips. These are very sensitive to static electricity. Your work area must be static free, and the best way is with a static-free mat. If you don't have one, take the following precautions. Don't wear running shoes on a shag carpet; it's better if the room is damp; and before you start to work, ground yourself by touching a water pipe. I also recommend that you use a grounded soldering iron. You will need just the standard project building kit for this one.

In Figure 1, you will notice that U1 is the RAM chip. To access 8K of memory, you need 13 address lines, A0 to A12. These lines are directly connected to the socket. Instead of drawing each wire separately, they are tied into what is known as a bus. The bus is indicated by a dark line. When members

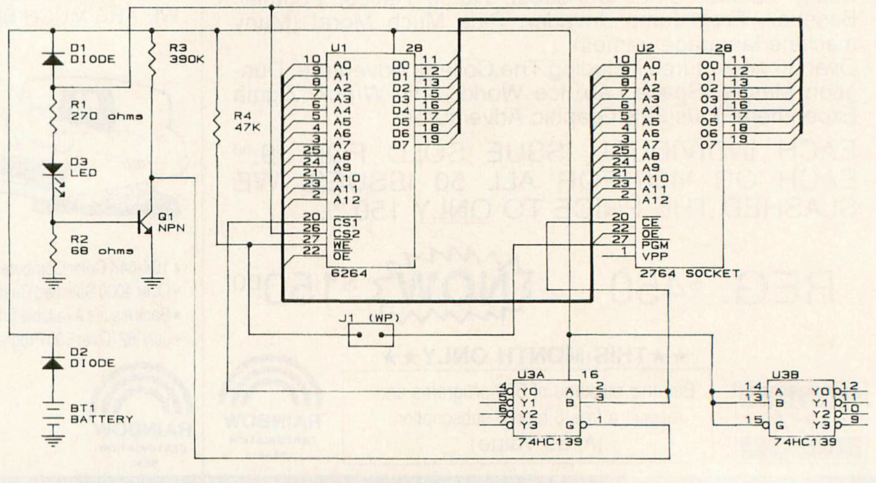
D1 DIODE
R3 390K
R1 270 ohms
R4 47K
D3 LED
Q1 NPN
R2 68 ohms
D2 DIODE
BT1 BATTERY
U1
28
10 A0
9 A1
8 A2
7 A3
6 A4
5 A5
4 A6
3 A7
25 A8
24 A9
21 A10
23 A11
2 A12
20 CS1
26 CS2
27 WE
22 OE
D0 11
D1 12
D2 13
D3 15
D4 16
D5 17
D6 18
D7 19
6264
U2
28
10 A0
9 A1
8 A2
7 A3
6 A4
5 A5
4 A6
3 A7
25 A8
24 A9
21 A10
23 A11
2 A12
20 CE
22 OE
27 PGM
1 VPP
O0 11
O1 12
O2 13
O3 15
O4 16
O5 17
O6 18
O7 19
2764 SOCKET
J1 (WP)
U3A
16
4 Y0
5 Y1
6 Y2
7 Y3
A 2
B 3
G 1
74HC139
U3B
14 A
13 B
15 G
Y0 12
Y1 11
Y2 10
Y3 9
74HC139

Figure 1: EPROM Emulator

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

go in and out of the bus, they have a name. Members of the same name connect together. For instance, A2 on the 6264 connects to A2 of the 2764 socket and so on. All of the eight data lines are also connected together.

In order for the RAM chip to retain its data, it must be kept powered at all times. This is where the battery comes in. It keeps the power to the chip at all times. The battery also keeps U3, R4 and Q1 (via R3) powered by way of D2. This way the memory chip cannot lose data. But this presents another problem. Touching the pins of a powered chip may change the contents of its memory. If you happen to touch the R/W line and the CE line, you've just changed memory, and you can't afford to change even one bit. The rest of the circuit is dedicated to protecting the memory.

When the emulator is powered from the 2764 socket (i.e., it is in circuit and the circuit is on), D1 is forward biased and conducting, and D2 is reversed biased and is shut off. The LED D3 is on and supplies base current to Q1, and Q1 is conducting and brings Pin 1 of the 74HC139 low. This pin is the enable to half of a 2 to 4 decoder. Many different kinds of chips will work here, but I picked this one because it is easy to get. With this chip enabled, the CE of the 2764 will pass through and enable the RAM chip. When there is no power to the 2764 socket, D2 is forward biased and keeps power to the RAM chip. On the other hand, D1 is reversed biased and is shut down. This turns off the LED and Q1 no longer gets base current and becomes high impedance. This lets Pin 1 of U3 go high. That disables the chip, and when the chip is disabled, you cannot change its data.

R4 is used to tie the R/W line of the RAM so that it defaults to a read operation. This is so that no writes to memory can be made when the power changes from external to battery or vice versa. The jumper J1 protects the chip from writes. When you are programming the emulator, you must have that jumper in. But, when it is time to use the emulator, you must remove this jumper. Again, this is another method to prevent writing to the RAM chip when you don't want to.

The other half of the 74HC139 is not used. The inputs are just tied high. This is necessary to prevent the chip from doing things on its own, like oscillating by itself and using up power for nothing. The ground connections to the ICs are not shown. You must connect Pin 14 of U1 and Pin 8 of U3 to Pin 14 of the 2764 socket U2. Normally, the power connections to these chips are not shown, but in order to get the power to the right places, I put in wires. Also, it may seem that not all pins are connected from the RAM chip to the EPROM socket; it is true, a couple are missing. Don't worry about it because they are not connected (N/C).

All the parts should be available at your local electronics parts shop. There are no hard-to-get parts. Your local Radio Shack store may have most of the parts, but not all. Note, R1 and R2 are in a delicate circuit and should not be substituted for a "close" value. Q1 is any "high gain" switching transistor such as a 2N2222 or a 2N3904. The battery voltage is about 3.6 volts. It can be just one or a combination of many, as long as it is about the right voltage. If you decide to use rechargeable batteries, a 300 ohm resistor across D2 will recharge them when the emulator is in use. The diodes should be low-leakage types with low, forward-voltage drop.

As far as the construction of the unit goes, I used one trick that works well. You need a printed circuit protoboard. I didn't have any around, so I cut a piece of protoboard from one of my previous projects. If you don't have one, Radio Shack does. You need one that's about 2 by 3 inches. You can cut it down to size later. It is better if you get the kind that does not have any bus lines. Get the type that has just pads; it is easier to work with.

Now, for the socket. There are many techniques, but the way I do it is quite simple. Take a 28-pin socket made for wire wrapping. Insert the socket halfway into the protoboard and solder all the pins. This way you get a 28-pin socket on top and a 28-pin "plug" on the bottom to put into your EPROM programmer. After all the pins are soldered, locate all the pins that are not the same on both. Solder a piece of wire just under the top socket. Solder another piece of wire to the bottom of the pin. Now cut the wire in between the two wires. This way, you get a clean cut without reheating the pin and taking a chance that the solder melts and the pin goes crooked.

If you write a lot of machine language programs that run in ROM or EPROM, this emulator will save you hours of time. Using the emulator is quite simple. After the construction is made, remove the jumper J1. Plug the emulator in an EPROM programmer and set the programmer for 2764. Insert the jumper and program the emulator. Normally, it takes a few minutes to program. It takes time for the EPROM circuits to change those 1s to 0s. But, it doesn't take any time to program RAM. If you can find where in the software the program delays are, change them to 0. You will see a great improvement in the time it takes to program the thing. Now, remove the jumper and remove the emulator. All you have to do is insert the emulator into a 2764 socket and you have the equivalent of a 2764 EPROM.

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Doing the Trivia Rag

By Mary and James Lamonica

Trivial Chances is a trivia game for one to six players that uses questions created from the `TRIVIAFC` program that is included.

The game has three twists that make it different from others. First, you can use the Radio Shack Speech/Sound Pak to have the questions read instead of just flashed on the screen. Second, you can override the computer scoring if the player's answer is correct but misspelled. For the answers, both first and last names are used. When one word is the answer, you do not use "a," "an" or "the." For example, one of the questions is, "What is the Star of Africa?" The answer is a diamond, so you would just type `DIAMOND`.

Lastly, the questions and answers are not in `DATA` lines. They are stored in tape or disk files. These are created by using the `TRIVIAFC` program. This allows you to use different files you have created. One file might be a trivia game, and another may be vocabulary words for your kids. If you create different files, be sure to edit Line 52 in the `TRIVIAG` program to load a different filename. In the `TRIVIAFC` program, you need to change lines 180 and 510.

Jim Lamonica teaches social studies and computer literacy at Magoffin Junior High School in El Paso, Texas. Mary teaches math at Jefferson High School. Both graduated from Eastern Illinois University.

TRIVIAG Program Summary

Line 20 clears out the graphics to allow for greater memory and sets the dimensions for the questions and answers. You may have up to 380 questions and answers. To have this many, you need to clear 19,000 characters of string space. You must also alter lines 70, 120 and 130 from 300 questions to the number you want. You will have increased memory if you use a tape system and you don't use the Speech/Sound Pak. If you have only a 16K tape system, you may have up to 200 questions, and you need to clear 10,000 characters.

Line 30 is the introduction. Lines 40 to 90 allow for the input of questions from the disk. To use the program with cassette, make the following changes:

```
52 OPEN "I", #-1, "TRIVIA"
60 IF EOF (-1) THEN 90
70 FOR NQ=1 TO 300:INPUT#-1,
   Q$(NQ),A$(NQ):NEXT NQ
90 CLOSE # -1
```

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Lines 100 and 110 allow for the input of the players' names.

Lines 120 to 170 are the game lines. Three loops are used. Loop GG is the basic game loop. It allows for passes through the loop based on the number of questions divided by the number of players. Loop G is used to keep track of the player number. The X loop is used to determine the print locations for the players' names. A red square appears by the player whose turn it is. This is done in the `PRINT@16+(G*16), CHR$(143 +48)` statement in Line 120.

Lines 122 to 126 allow for the point value to be assigned to each question. The computer rolls an electronic die, so each question may be worth from 1 to 6 points.

Lines 130 and 140 randomly choose the questions and test to see if they have been used. This is done by matching the question number with used question numbers in Array S. The input of the player's answer is also done here. The subroutine at Line 200 is used for the Speech/Sound Pak.

Line 150 checks to see if the player's answer is correct and, if it is, goes to the subroutine at Line 300 for the Speech/Sound Pak.

Line 160 is used if the player's answer is wrong. If the player is close to the correct answer, you may override the computer scoring by pressing Y (Yes). This is done in Line 162. You must press either Y (Yes) or N (No).

Variable Summary

TRIVIAG

Q$ = Questions
A$ = Answers
S = Used Questions
PN$ = Player name
PS = Player score
PA$ = Player answer
PV = Point value
IN$ = Inkey

TRIVIAFC

IK$ = Inkey
QN = Question number
NQ = Next Question
Q$ = Questions
N = Counter
A$ = Answers
N1 = Counter

Lines 180 and 190 are used if you use all of the questions in the file.

Lines 200 to 370 are used for the Speech/Sound Pak. If you do not want this, delete these lines and delete the `GOSUB` statements in lines *140* and *160*. My Speech/Sound Pak is connected with the disk controller by a Y-cable. The Multi-Pak Interface will also work.

Trivia File Creation

`TRIVIAFC` is the question file creation program. It allows you to create 400 questions, but you do not need to type them all in at the same time. To prevent problems with possible loss of data, I usually type in 20 questions and answers at one time.

You may use this program with a tape system by making the following changes:

```
180 OPEN ″0″,#-1,″TRIVIA″
200 FORN1=1TON:PRINT#-1,Q$
 (N1),A$(N1):NEXTN1
210 CLOSE#-1:GOTO30
510 OPEN″I″ ,#- 1,″TRIVIA″
520 IF EOF(-1)THEN550
530 NQ=NQ+1:INPUT#-1,Q$(NQ),A$
 (NQ)
550 CLOSE#-1
```

(Questions about this program may be directed to the Lamonicas at 10456 Orpheus, El Paso, TX 79924. Please enclose an SASE for a response.) ☐

Editor's Note: `TRIVIA`, *a data file containing 300 questions, will immediately follow the* `TRIVIAFC` *program listing on this month's RAINBOW ON TAPE and RAINBOW ON DISK*

Listing 1: `TRIVIAG`

```
10 'trivial chances (C) 1987
11 'BY JAMES & MARY LAMONICA
12 '
20 PMODE0:PCLEAR1:CLEAR16000:DIM
Q$(300),A$(300),S(300),PN$(6),PS
(6)
30 CLS(3):SOUND200,2:PRINT@72,"t
rivial  chances";:PRINT@160,"THI
S IS A TRIVIA GAME CREATED BYJAM
ES AND MARY JEAN LAMONICA    (C)
 1984. EL PASO, TEXAS, U.S.A PRE
SS ANY KEY TO BEGIN THE GAME":SO
UND200,2:EXEC44539
40 CLS(4):SOUND200,2:PRINT@32,"T
O LOAD IN THE QUESTION FILE,
PRESS ANY KEY":SOUND200,2:EXEC44
539
50 PRINT@199,"SEARCHING FOR FILE
";
52 OPEN"I",#1,"TRIVIA"
55 PRINT@199,"    LOADING DATA
";:SOUND200,2
60 IF EOF(1)=-1 THEN 90
70 FOR NQ=1TO300:INPUT#1,Q$(NQ),
A$(NQ):NEXT NQ
90 CLOSE#1
100 CLS(3):SOUND200,2:PRINT@32,"
HOW MANY PLAYERS (1-6)";:INPUT N
P
110 FOR X=1TONP:PRINT@96,"NAME O
F PLAYER";X;:INPUTPN$(X):PRINT@9
6,"":NEXTX
120 FORGG=1TOINT(300/NP):FORG=1T
ONP:CLS(3):FORX=1TONP:PRINT@17+(
X*16),PN$(X);PS(X):NEXTX:PRINT@1
6+(G*16),CHR$(143+48);
121 PRINT@480,MEM;
122 PRINT@416,"PRESS <ENTER> FOR
 POINT VALUE"
124 I$=INKEY$:PV=RND(6):IF I$=CH
R$(13) THEN 126 ELSE 124
126 PRINT@416,"":PRINT@416,"THIS
 QUESTION IS WORTH";PV
130 R=RND(300):IF S(R)=R OR Q$(R
)=""THEN130
140 S(R)=R:PRINT@256,Q$(R);"?":G
```

```
OSUB200:PRINT@320,"";:INPUTPA$
150 IF PA$=A$(R) THEN GOSUB300:P
S(G)=PS(G)+PV:PRINT@256,"":PRINT
@256,"YOU ARE CORRECT "PN$(G)::F
ORX=1TO3*460:NEXTX:GOTO170
160 IF PA$<>A$(R) THEN IA$="YOU
ARE INCORRECT THE ANSWER IS ":PR
INT@256,IA$;:GOSUB300:PRINT@320,
"":PRINT@320,A$(R):PRINT@416,"":
PRINT@416,"OVERRIDE COMPUTER SCO
RE (Y/N)";
162 IN$=INKEY$:IF IN$="Y"THENPS(
G)=PS(G)+PV:GOTO170 ELSE IF IN$=
"N" THEN 170 ELSE GOTO162
170 NEXTG:NEXTGG
180 CLS(8):PRINT@96,"YOU HAVE US
ED ALL THE QUESTIONS THE FINAL S
CORES WERE":FORX=1TONP:PRINT@177
+(X*16),PN$(X);PS(X):NEXTX
190 GOTO190
200 XX=&HFF00:YY=&HFF7E:POKEXX+1
,52:POKEXX+3,63:POKEXX+35,60
201 FOR II=1 TO LEN(Q$(R))
210 IF PEEK(YY) AND 128=0 THEN 2
10
220 POKE YY, ASC(MID$(Q$(R),II,1
))
230 NEXT II
240 IF PEEK(YY) AND 128=0 THEN 2
40
250 POKE YY,13
260 RETURN
300 IF PA$<>A$(R) THEN AA$=IA$+A
$(R) ELSE AA$="YOU ARE CORRECT"+
PN$(G)
310 FOR II=1 TO LEN(AA$)
320 IF PEEK(YY) AND 128=0 THEN 3
20
330 POKE YY, ASC(MID$(AA$,II,1))
340 NEXT II
350 IF PEEK(YY) AND 128=0 THEN 3
50
360 POKE YY,13
370 RETURN
```

Listing 2: TRIVIAFC

```
10 PMODE0:PCLEAR1:CLEAR20000
20 DIMQ$(400),A$(400)
30 CLS(3):PRINT@32,"THIS IS A PR
OGRAM TO CREATE A  QUESTION AND
 ANSWER FILE FOR THE'trivial cha
nces' GAME CREATED  BY JAMES & M
```

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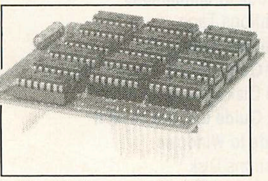

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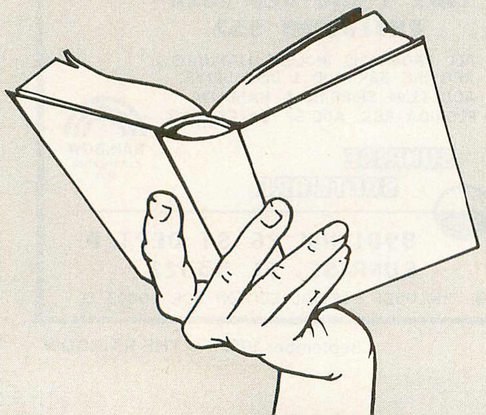

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```
ARY JEAN LAMONICA   (C) 1987. PR
ESS A KEY TO BEGIN.":EXEC44539
40 PRINT@224,"DO YOU WISH TO LOA
D A PARTAILLY COMPLETED QUESTION
 FILE (Y OR N)"
50 IK$=INKEY$
60 IF IK$="Y" THEN GOSUB 500
70 IF IK$="N" THEN 90
75 IF IK$="Y" THEN90
80 GOTO 50
90 CLS(3):PRINT@32,"YOU MAY ENTE
R";400-NQ;" QUESTIONS":PRINT@96,
"ENTER THE NUMBER OF ADDITIONAL
 QUESTIONS YOU WISH TO ENTER AT
 THIS TIME.";:INPUTQN
100 CLS(3):PRINT@64,"YOU WILL BE
 ASKED FIRST FOR THE QUESTION AN
D THEN THE ANSWER.  THE QUESTIO
NS ARE LIMITED TO 30 CHARACTERS.
 THE ANSWERS TO 20.  PRESS A KEY
 TO CONTINUE.":EXEC44539
110 FORN=NQ+1TONQ+QN
120 CLS(3):PRINT@32,"QUESTION #"
;N;:PRINT@96,"TYPE IN QUESTION &
 PRESS ENTER ":INPUT Q$(N)
130 IF LEN(Q$(N))>30 THEN PRINT"
QUESTION EXCEEDS MAXIMUM LENGTH"
:FOR X=1TO460*3:NEXTX:GOTO120
140 PRINT@224,"TYPE IN ANSWER &
PRESS ENTER   ":INPUT A$(N)
150 IF LEN(A$(N))>20 THEN PRINT"
ANSWER EXCEEDS MAXIMUM LENGTH  "
:FORX=1TO460*3:NEXTX:PRINT@256,"
":PRINT@288,"":GOTO140
160 NEXT N
170 CLS(5):PRINT@96,"TO SAVE THE
 QUESTION FILE, PUT  DISK IN AND
 PRESS A KEY PLEASE": EXEC44539
180 OPEN"O",#1,"TRIVIA"
190 PRINT@202,"SAVING DATA";
200 FOR N1=1TON:WRITE#1,Q$(N1),A
$(N1):NEXTN1
210 CLOSE#1:GOTO30
499 END
500 CLS(4):PRINT@32,"POSITION TH
E DISK AND PRESS A   KEY TO BEGI
N.":EXEC44539
505 PRINT@106,"FINDING FILE";
510 OPEN"I",#1,"TRIVIA"
515 PRINT@106,"LOADING DATA";
520 IF EOF(1)=-1 THEN 550
530 NQ=NQ+1:INPUT#1,Q$(NQ),A$(NQ
)
540 GOTO 520
550 CLOSE#1
560 RETURN
```

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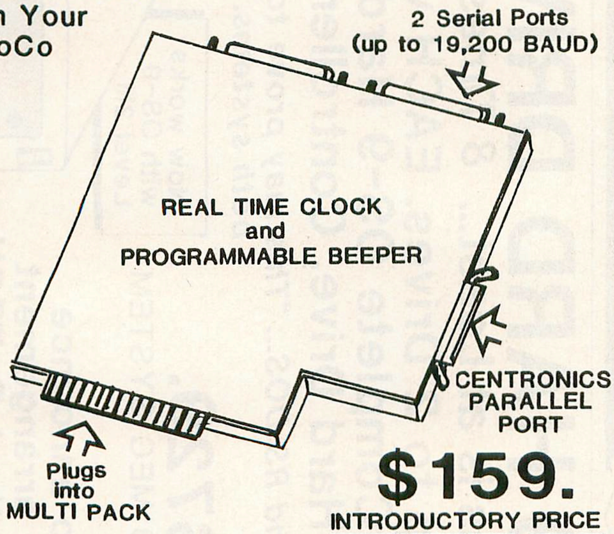

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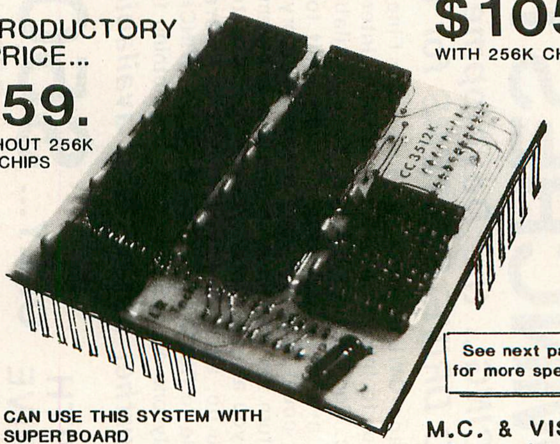

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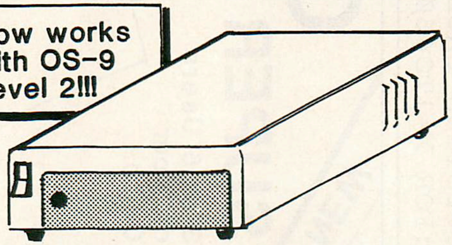

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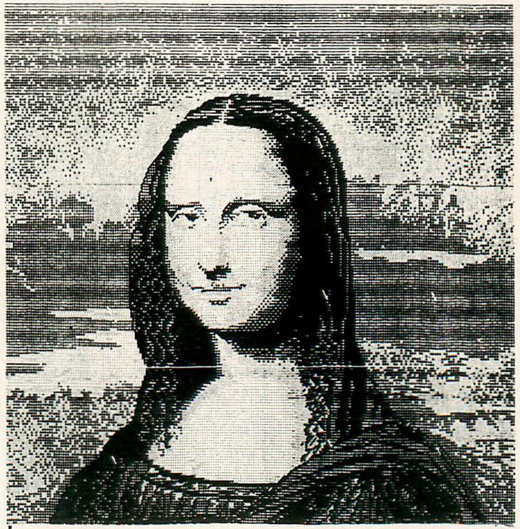

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KISSable OS-9

Primitive Drawing Tools

By Dale L. Puckett
Rainbow Contributing Editor

The Complete Rainbow Guide to OS-9 Level II, Volume I: A Beginners Guide to Windows is at the printer. The project was long and time-consuming for both Peter and me. It was also a lot of fun. We're trying to wind down to normal now, so it'll be a short column this month. But, we predict you'll have a lot of fun as soon as you dig into the BASIC09 listings we're presenting here.

One of the nice things about the CoCo 3 is the high resolution mouse adapter you can buy for less than $10 at your local Radio Shack store. Because a lot of the early CoCo 3 OS-9 Level II software did not support this handy tool, we thought we would see what we could build. Besides, we wanted to get you started on your personal CoCo Draw program.

In our new book, we generated a simple, but nice, drawing program that you drive from a menu printed on an overlay window. From that menu you can draw a straight line, a box or a

Listing 1: KISSDRAW

```
PROCEDURE KISSdrawellipse
(* Program to draw a ellipse at location pointed
(* to by high resolution mouse.

(* Uses procedure KISSGetMouse

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM Mouse:rodent

(* Let's draw with a pencil cursor

RUN gfx2("gcset",202,2)

PRINT "Move pencil to center of ellipse and press mouse button."
PRINT "Hold button down and drag.  Release at corner of"
PRINT "rectangle framing ellipse."

REPEAT

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

UNTIL Mouse.CBSA<>0

RUN gfx2("setdptr",Mouse.BDX,Mouse.BDY)
RUN gfx2("POINT",Mouse.BDX,Mouse.BDY)

WHILE Mouse.CBSA<>0 DO

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)
```

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Complete Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.*

circle. You will be surprised at the number of different objects you can create with these three simple primitive drawing tools.

We became so fascinated with our new toy, we wanted to improve it. This month, we feature two listings, `KISSDraw` and `CoCoDraw`. We'll get you started with the procedure that draws a box. Once you pick up the trick, you'll be able to add a number of your own primitive drawing tools.

We'll also show you two versions of the menu program that lets you select the tools. The book should be at your local Radio Shack store by the time you read this column, so you'll be able to get a head start on the `DrawCircle` and `DrawLine` routines. Hopefully, in a later issue we can build a menu made out of icons so you can select and direct your new drawing tools by pointing and clicking.

`KISSDraw` could be the start of a fun CoCo Community programming project. If you have ideas or a short procedure or two to add, send them along and we'll get them published as quickly as we can.

The listing `CoCoDraw` contains procedures named `SetUpMouse`, `GetMouse`, `DrawBox` and `DrawObjects`. `KISSDraw` is made up of `SetUpMouse`, `GetKISSMouse`, `KISSDrawBox` and `DrawObjects`. The `SetUpMouse` routine is the same in both listings. We left it in both packages to make things easier to follow when you type them. `DrawObjects` is similar in both listings, but not the same. The cosmetic routines that keep the unnecessary clutter off the screen are a bit different.

The lesson in this month's listings can be found by carefully studying the differences between `GetMouse` and `GetKISSMouse`, as well as the differences between `DrawBox` and `KISSDraw-`

```
ENDWHILE

RUN gfx2("ellipse",ABS(Mouse.BDX-Mouse.AcX),ABS(Mouse.BDY-Mouse.AcY

))
RUN gfx2("bell")

END


PROCEDURE KISSdrawbar
(* Program to draw a bar at location pointed
(* to by high resolution mouse.

(* Uses procedure KISSGetMouse

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM Mouse:rodent

(* Let's draw with a pencil cursor

RUN gfx2("gcset",202,2)

PRINT "Move pencil to first corner and press mouse button. Then,"
PRINT "hold button down and drag.  Release at opposite corner."

REPEAT

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

UNTIL Mouse.CBSA<>0

RUN gfx2("setdptr",Mouse.BDX,Mouse.BDY)
RUN gfx2("POINT",Mouse.BDX,Mouse.BDY)

WHILE Mouse.CBSA<>0 DO

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

ENDWHILE

RUN gfx2("bar",Mouse.AcX,Mouse.AcY)
RUN gfx2("bell")
```

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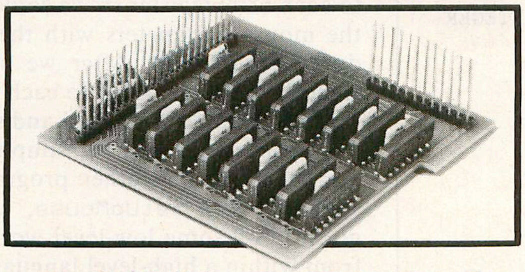

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```
END


PROCEDURE KISSdrawline
(* Program to draw a line at location pointed
(* to by high resolution mouse.

(* Uses procedure KISSGetMouse

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM Mouse:rodent

(* Let's draw with a pencil cursor

RUN gfx2("gcset",202,2)

PRINT "Move pencil to first end and press mouse button. Then,"
PRINT "hold button down and drag.  Release at opposite end."

REPEAT
RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

UNTIL Mouse.CBSA<>0

RUN gfx2("setdptr",Mouse.BDX,Mouse.BDY)
RUN gfx2("POINT",Mouse.BDX,Mouse.BDY)

WHILE Mouse.CBSA<>0 DO

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

ENDWHILE

RUN gfx2("line",Mouse.AcX,Mouse.AcY)
RUN gfx2("bell")

END


PROCEDURE KISSdrawcircle
(* Program to draw a circle at location pointed
(* to by high resolution mouse.

(* Uses procedure KISSGetMouse

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM Mouse:rodent

(* Let's draw with a pencil cursor

RUN gfx2("gcset",202,2)

PRINT "Move pencil to center of circle and press mouse button. Then,"
PRINT "hold button down and drag.  Release at point where"
PRINT "line drawn through center intersects radius."
```

Box. Other tricks can be learned by studying the methods we used to build our menu in an overlay window. When we created the overlay window, we saved the material underneath it so that OS-9 could repaint the screen when we were through with the menu.

In the CoCoDraw version, you'll notice that we only worked with three pieces of information from the high resolution mouse. Much more is available, and we used some of it in KISSDraw. With CoCoDraw, we stuck to the horizontal and vertical position of the mouse and the status of the button. We used one of the graphics cursors built into OS-9 to tell us where we were pointing with the mouse.

We clear the screen first and print a welcome message in boldface type. The first procedure we run is SetUpMouse, which essentially tells OS-9 that you are using a high resolution mouse that can point to any one of 640 pixels across the screen in 192 individual rows.

SetUpMouse uses the SysCall routine that comes with the OS-9 Level II version of BASIC09. SysCall lets you call machine language routines within OS-9 from your BASIC09 program. The technical manual tells you the information you need to give each OS-9 system subroutine when you call it. The variable callcode is the number of the subroutine you want to use. You must give OS-9 the rest of the information by putting the proper value in each of the 6809's registers.

Since the order of the registers in the 6809 never changes, we can create our own data type that looks just like the 6809 microprocessor in our Color Computer. That's what we're doing with the TYPE statement in the procedure named SetUpMouse. Notice that after we defined this new data type, we still had to reserve memory for a variable of this data type. We called our variable regs.

Notice also that BASIC09 lets you read from or write to individual fields in a record made of a customized data type. That's why we were able to assign values to each 6809 register so we could set up the mouse parameters with the procedure SetUpMouse. After we have assigned the proper value to each register that needs to be initialized and selected the proper callcode, we simply "run" SysCall like any other program. Essentially with SetUpMouse, we have given OS-9 some low-level work to do from within a high-level language.

Before you run CoCoDraw or KISSDraw, you must load all of the system fonts, pointers and patterns into a buffer. We used `stdpats_4` since we planned to run our drawing programs in four color windows.

We do it with a procedure file called from our start-up file. It looks like this:

```
merge /dd/sys/stdfonts >/w
merge /dd/sys/stdptrs >/w
merge /dd/sys/stdpats_4 >/w
```

In the `CoCo Draw` listing, the procedure `DrawBox` selects the pencil as a graphics cursor. Notice how we did that by running `gcset`, one of the built-in `gfx2` commands that comes with BASIC09. In fact, you'll notice as you study these that the drawing programs were built by simply running a number of the `gfx2` commands in the proper order.

In the `DrawBox` procedure we have defined the packet of information that the `SysCall` routine generates when it calls the set status call named `SS.Mouse` as an array of 32 bytes. Then, we read the horizontal and vertical positions and determine the status of the mouse button by looking at the proper byte in the array. We knew which byte to look for — almost — by looking at the table on Page 8-125 of the OS-9 Technical Reference Manual.

Unfortunately, an extra two bytes have been reserved for the future, four bytes into the packet. This throws the count off and leads to a lot of confusion. You won't need to worry, however. You'll find the names of each field in the packet are the same in the special data type we defined in the procedure `KISS-DrawBox` as they are in the table. We called the two reserved integers `X1` and `X2`.

Notice how BASIC09's `TYPE` statement let us define a 32-byte variable that just happens to look like the data returned by the set status call `SS.MOUSE`. Once we had defined this new data type, we were

```
REPEAT

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

UNTIL Mouse.CBSA<>0

RUN gfx2("setdptr",Mouse.BDX,Mouse.BDY)
RUN gfx2("POINT",Mouse.BDX,Mouse.BDY)

WHILE Mouse.CBSA<>0 DO

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)
ENDWHILE

RUN gfx2("circle",ABS(Mouse.BDX-Mouse.AcX))
RUN gfx2("bell")

END


PROCEDURE SetUpMouse
(* This procedure uses the program 'SysCall' to
(* do a set status call which sets up OS-9 to treat
(* the Color Computer Mouse as a high resolution device
(* using the right joystick port.  Because, this change is
(* systemwide, another program using the mouse later would
(* also need to know how to use the optional high
(* resolution mouse adapter.

(* Since this set status call is also used to change the
(* key repeat start constant and delay speed, it tells
(* OS-9 to leave those parameters unchanged.

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

DIM regs:registers
DIM callcode:BYTE

(* Now set up the mouse parameters

regs.a:=0
regs.b:=$94
regs.x:=$0101
regs.y:=$FFFF
callcode:=$8E

RUN syscall(callcode,regs)

END
```

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able to read from or write to any field in it. We read the ones we needed to emulate other drawing programs.

To use KISSDrawBox, you move the mouse to the point on the screen where you want to place one corner of the box. With the graphics cursor over that point, you push down the button on the mouse and hold it while you move the mouse to the point where you would like to see the opposite corner of the box. When the graphics cursor is over this point, you release the mouse button and a box pops on your screen.

Study the routines this month, take a look at the DrawCircle and DrawLine routines in our new book and let us know what you want to add. If you're ambitious, show us how you would go about it. We'll compare notes and feature the best in the future. This could be the start of an exciting project.

Tip of the Month

Download Carl Kreider's Ar utility from RAINBOW's Delphi OS-9 Online SIG. It'll save you a lot of valuable online time and make it much easier for you to download the new OS-9 programs appearing in the database.

Carl is the new librarian for the OS-9 Users Group. While the title is new, the job isn't. Carl has been helping Dave Kaleita, the group's new vice president, for several years. These guys have done a tremendous job for you. There are nearly 70 disks available in the library. Most have nearly a dozen programs on them, although a few are packed full with one or two useful applications programs. Help these guys help you. Join the group now and take advantage of their library. You couldn't buy the education that's hiding on those disks.

Tip Two

After you download Ar, download Kevin Darling's new OS-9 Level II utilities. He's updated the tools he published in his book and added several new ones. Speaking of Kevin's book, *Inside OS-9 Level II* is a gold mine for the hacker. You'll learn more than you can ever remember about OS-9 system variables, the Color Computer's GIME, the file managers, the windows, the fonts, the descriptors and the bugs. It's a reference work extraordinaire! Buy it. By the way, Kevin spends hours and hours answering your questions on the RAINBOW OS-9 Online Forum. Sign on and say hello.

That's it for September. Enjoy the BASIC09 procedures and keep on hacking! ☐

```
PROCEDURE GetKISSMouse
(* Reads the present location of the mouse and
(* returns the status of the button.

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM RegisterSet:registers
DIM callcode:BYTE
PARAM Mouse:rodent

RegisterSet.a:=0
RegisterSet.b:=$89
RegisterSet.x:=ADDR(Mouse)
RegisterSet.y:=1
callcode:=$8D

RUN syscall(callcode,RegisterSet)

END


PROCEDURE KISSdrawbox
(* Program to draw a box at location pointed
(* to by high resolution mouse.

(* Uses procedure KISSGetMouse

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:INTEGER

; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE; X2,BDX,BDY:INTEGER

; Stat,Res:BYTE; AcX,AcY,WRX,WRY:INTEGER

DIM Mouse:rodent

(* Let's draw with a pencil cursor

RUN gfx2("gcset",202,2)

(* We must make sure we have turned on the
(* the high resolution mouse

RUN Setupmouse

PRINT "Move pencil to first corner and press mouse button. Then,"
PRINT "hold button down and drag.  Release at opposite corner."

REPEAT

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

UNTIL Mouse.CBSA<>0

RUN gfx2("setdptr",Mouse.BDX,Mouse.BDY)
RUN gfx2("POINT",Mouse.BDX,Mouse.BDY)

WHILE Mouse.CBSA<>0 DO

RUN getKISSmouse(Mouse)
RUN gfx2("putgc",Mouse.AcX,Mouse.AcY)

ENDWHILE
```

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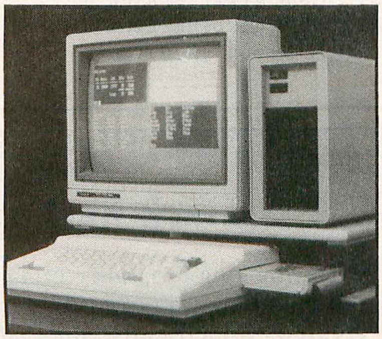

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```
RUN gfx2("box",Mouse.AcX,Mouse.AcY)
RUN gfx2("bell")

END


PROCEDURE DrawObjects
DIM button:BYTE
DIM horiz,vert:INTEGER
DIM choice:STRING[1]

(* First, clear the window
RUN gfx2("clear")

(* And greet them with a boldfaced message
RUN gfx2("boldsw","on")
PRINT "Welcome to CoCo Draw!"

(* Don't forget to turn bold printing off
RUN gfx2("boldsw","off")

(* and prepare OS-9 for the High Resolution Mouse *)
RUN SetUpMouse

REPEAT
(* We'll put the menu in an
(* overlay window
RUN gfx2("owset",1,5,5,30,13,2,4)

(* We should turn on the text cursor
RUN gfx2("curon")

(* and turn off the graphics cursor for now
RUN gfx2("gcset",0,0)
(* Here's our menu
PRINT "You may draw one object."
PRINT
PRINT "      1. A box"
PRINT "      2. A circle"
PRINT "      3. A line"
PRINT "      4. An Ellipse"
PRINT "      5. A bar"
PRINT
PRINT "      0. To Quit"

PRINT

(* Draw attention to our prompt
RUN gfx2("revon")
PRINT "Which one: ";

(* But after we get their attention
(* we want to return to normal print
RUN gfx2("revoff")

(* Now, wait for their response
REPEAT
RUN inkey(choice)
UNTIL choice<>""

(* When they answer, we'll
(* turn off the cursor and
(* close our window to give
(* them a full screen to draw in
RUN gfx2("curoff")
RUN gfx2("owend")
(* We must run the drawing program
(* they have selected.
IF choice="1" THEN
RUN gfx2("CurHome") \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
RUN gfx2("CurHome")
RUN gfx2("curoff")
RUN KISSdrawbox
RUN gfx2("CurHome")
ELSE
IF choice="2" THEN
RUN gfx2("CurHome") \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
RUN gfx2("CurHome")
RUN gfx2("curoff")
RUN KISSdrawcircle(mouse)
ELSE
IF choice="3" THEN
RUN gfx2("curoff")
RUN gfx2("CurHome") \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
RUN gfx2("CurHome")
RUN gfx2("curoff")
RUN KISSdrawline(mouse)
ELSE
IF choice="4" THEN
RUN gfx2("curoff")
RUN gfx2("CurHome") \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
RUN gfx2("CurHome")
RUN KISSdrawellipse(mouse)
ELSE
IF choice="5" THEN
RUN gfx2("CurOff")\RUN gfx2("CurHome")\RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine") \RUN gfx2("CurHome")
RUN KISSdrawbar(mouse)
ENDIF
ENDIF
ENDIF
ENDIF
ENDIF
UNTIL choice="0"
RUN gfx2("CurHome")
RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
PRINT  \RUN gfx2("ErLine")
RUN gfx2("gcset",0,0)
END
```

Hint . . .

Hack Backtracking

During long program editing sessions, a tired mind can go a long way toward destroying what you have created. Specifically, an inadvertent "hack" by pressing H in the edit mode can leave you cold. If you have mistakenly "hacked" a line, hold down SHIFT and press the up arrow, and then press A to get back to the start of the line without any changes.

Ralph Ritchey
Wrangell, AK

Listing 2: CoCoDraw

```
PROCEDURE SetUpMouse
(* This procedure uses the program 'SysCall' to
(* do a set status call which sets up OS-9 to treat
(* the Color Computer Mouse as a high resolution device
(* using the right joystick port.  Because, this change is
(* systemwide, another program using the mouse later would
(* also need to know how to use the optional high
(* resolution mouse adapter.

(* Since this set status call is also used to change the
(* key repeat start constant and delay speed, it tells
(* OS-9 to leave those parameters unchanged.

TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

DIM regs:registers
DIM callcode:BYTE

(* Now set up the mouse parameters

regs.a:=0
regs.b:=$94
regs.x:=$0101
regs.y:=$FFFF
callcode:=$8E

RUN syscall(callcode,regs)

END

PROCEDURE GetMouse
(* Reads the present location of the mouse and
(* returns the status of the button.
TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER

DIM regs:registers
DIM path,callcode:BYTE
DIM packet(32):BYTE

PARAM horiz,vert:INTEGER
PARAM button:BYTE

REPEAT

regs.a:=0
regs.b:=$89
regs.x:=ADDR(packet)
regs.y:=1

callcode:=$8D

RUN syscall(callcode,regs)

horiz:=packet(25)*256+packet(26)
vert:=packet(27)*256+packet(28)
button:=packet(9)

RUN gfx2("putgc",horiz,vert)
UNTIL button<>0
END
PROCEDURE drawbox
(* Program to draw a box at location pointed
(* to by high resolution mouse.

(* Uses procedure GetMouse
(* Called by procedure DrawObjects
```

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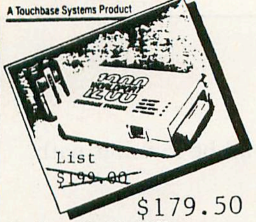

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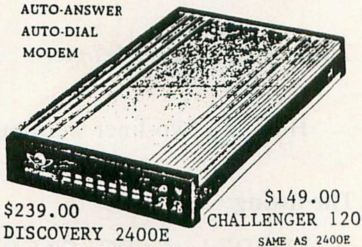

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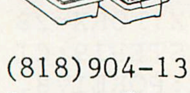

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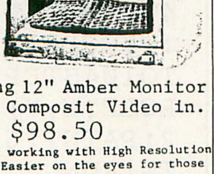

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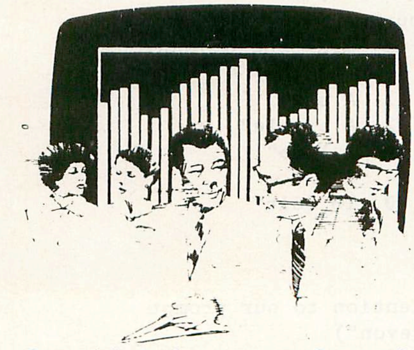

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```
DIM horiz,vert,Horiz1,vert1:INTEGER
DIM button:BYTE

RUN gfx2("gcset",202,1)

RUN gfx2("curup")
RUN gfx2("erline")
PRINT "Point to first corner of box and click mouse."

RUN getmouse(horiz,vert,button)
Horiz1:=horiz
vert1:=vert
RUN gfx2("setdptr",Horiz1,vert1)
RUN gfx2("POINT",Horiz1,vert1)
RUN gfx2("curup")
RUN gfx2("erline")
PRINT "Point to location of opposite corner and click again."
RUN getmouse(horiz,vert,button)
RUN gfx2("box",horiz,vert)
RUN gfx2("bell")
END
PROCEDURE DrawObjects
DIM button:BYTE
DIM horiz,vert:INTEGER
DIM choice:STRING[1]

(* First, clear the window
RUN gfx2("clear")

(* And greet them with a boldfaced message
RUN gfx2("boldsw","on")
PRINT "Welcome to CoCo Draw!"

(* Don't forget to turn bold printing off
RUN gfx2("boldsw","off")

(* and prepare OS-9 for the High Resolution Mouse *)
RUN SetUpMouse

REPEAT
(* We'll put the menu in an
(* overlay window
RUN gfx2("owset",1,5,5,30,10,2,4)

(* We should turn on the text cursor
RUN gfx2("curon")

(* and turn off the graphics cursor for now
RUN gfx2("gcset",0,0)
(* Here's our menu
PRINT "You may draw one object."
PRINT
PRINT "     1. A box"
PRINT "     2. A circle"
PRINT "     3. A line"
PRINT
PRINT "     0. To Quit"

PRINT

(* Draw attention to our prompt
RUN gfx2("revon")
PRINT "Which one: ";

(* But after we get their attention
(* we want to return to normal print
RUN gfx2("revoff")

(* Now, wait for their response
REPEAT
RUN inkey(choice)
UNTIL choice<>""

(* When they answer, we'll
(* turn off the cursor and
(* close our window to give
(* them a full screen to draw in
RUN gfx2("curoff")
RUN gfx2("owend")

(* We must run the drawing program
(* they have selected.
IF choice="1" THEN
RUN gfx2("curoff")
RUN gfx2("CurHome")
RUN gfx2("ErLine")
RUN drawbox
ELSE
IF choice="2" THEN
RUN gfx2("CurHome")
RUN gfx2("ErLine")
RUN gfx2("curoff")
PRINT "See CRGTOS-9 for this procedure"
ELSE
IF choice="3" THEN
RUN gfx2("curoff")
RUN gfx2("CurHome")
RUN gfx2("ErLine")
PRINT "See CRGTOS-9 for this procedure too!"
ENDIF
ENDIF
ENDIF
UNTIL choice="0"
RUN gfx2("CurHome")
RUN gfx2("ErLine")
RUN gfx2("gcset",0,0)
END
```

Two-Liner Contest Winner . . .

Here is a two-liner we should all be familiar with.

The listing:

```
5 PMODE4,1:PCLS:SCREEN1,1:LINE(5
,4)-(250,186),PSET,B:FORX=4TO102
STEP14:LINE(128,X)-(250,X),PSET:
NEXTX:FORX=102TO186STEP14:LINE(5
,X)-(250,X),PSET:NEXTX:LINE(128,
4)-(128,102),PSET:FORX=18TO168ST
EP28:PAINT(129,X+1),1,1:NEXTX:PO
KE178,1:FORX=4TO182STEP28
6 PAINT(129,X+1),,1:NEXTX:FORX=1
4TO90STEP19:FORY=19 TO 121STEP18
:CIRCLE(Y,X),2,1:NEXTY,X:FORX=28
TO104STEP18:FORY=23TO81STEP19:CI
RCLE(X,Y),2.5,1:NEXTY,X:POKE178,
2:PAINT(6,6),,1:FORW=1TO5000:NEX
TW:RUN
```

K.T. Cunin
Worthington, OH

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

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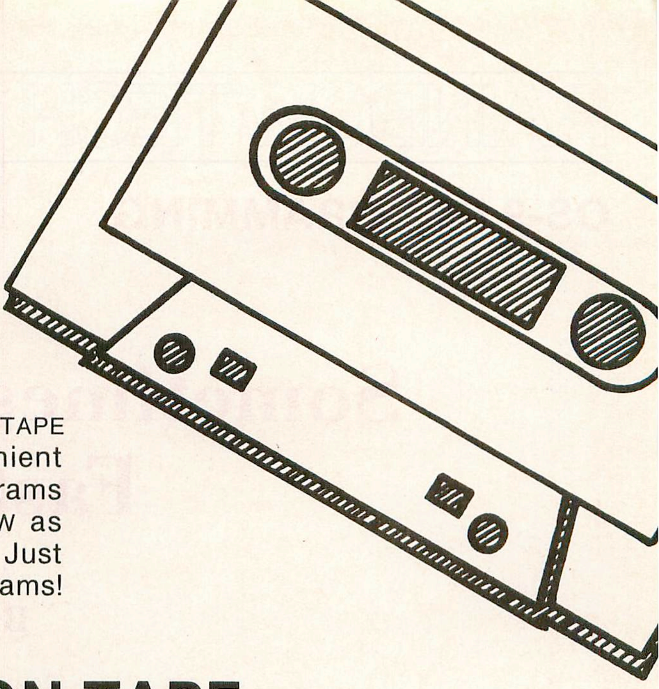

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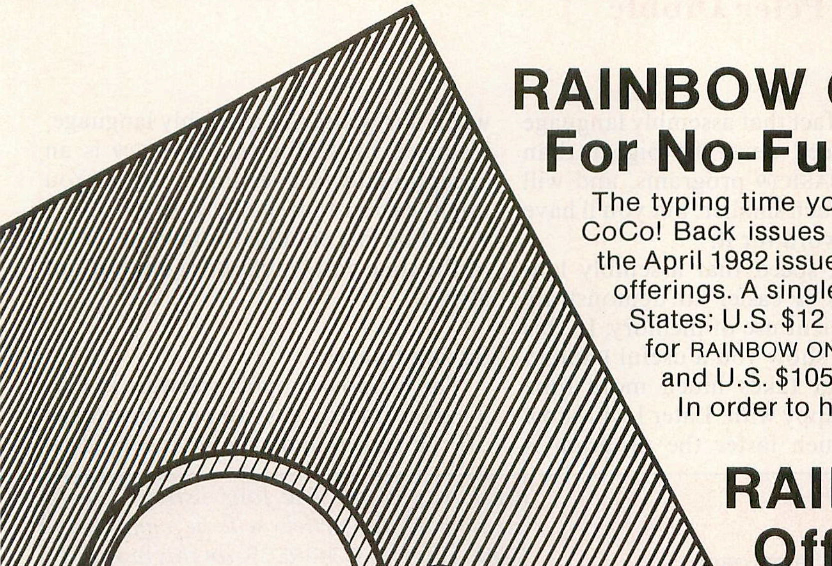

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OS-9 PROGRAMMING

Sometimes BASIC09 Isn't Fast Enough

By Peter Dibble

The BASIC09 language is an exceptional version of BASIC. You will find that the speed of BASIC09 on a Color Computer, even a CoCo 2, is in the same class as Microsoft BASIC on an IBM AT. The elegance of Microsoft BASIC is not even close to BASIC09.

If BASIC09 is so wonderful, why do I keep bringing up assembly language? Four reasons: It's easy to use all the features of the OS-9 operating system and the 6809 microprocessor from assembly language, it's a fun language to use, assembly language programs can be small, and they can be fast.

For hobbyists, fun is the best reason to use assembly language. An unfriendly language like assembler doesn't sound fun to work with, but it is. If you don't find assembly language amusing, concentrate on how small and fast assembly language programs are compared to BASIC09 programs.

It's hard for me to prove the case for assembly language programs being small compared to BASIC09 programs. The smallest BASIC09 program is a few bytes of code plus about 12K of `Runb`. To do a fair test, I would need to code a very large program in both assembler and BASIC09. That would be too much work. It is a fact that assembly language programs need never be bigger than equivalent BASIC09 programs, and will usually be much smaller, but you'll have to take my word for it.

The extra speed that assembly language offers is easier to demonstrate than its efficient use of memory. In this article I will show you a useful BASIC09 program that takes much more time than I feel happy with. Later I will show you how much faster the program is when it is written in assembly language. I started by saying that BASIC09 is an exceptionally fast version of BASIC. You might expect that BASIC09 on a CoCo 3 would be fast enough for anyone. Most of the time you would be right, but not always.

Saving Images

The window support software in OS-9 makes it fairly easy to pick any image off the screen and save it. It would be

Editor's Note: The four listings presented in this article will be combined into one file, COMPRESS, *on this month's RAINBOW ON DISK.*

Listing 1: `SaveImage`

```
PROCEDURE SaveImage
 0000       DIM FileName:STRING[99]
 000C       INPUT "Image file name: ",FileName
 0025       RUN compress(FileName)
 002F       END
```

Listing 2: `Compress`

```
PROCEDURE Compress
 0000       PARAM OutFileN:STRING[99]
 000C       DIM InC:BYTE
 0013       DIM RunL:BYTE
 001A       DIM OutPath,Window:BYTE
 0025       DIM Nyble,LNyble:BYTE
 0030       DIM N1:BOOLEAN
 0037       DIM buffer(7680):BYTE
 0043       DIM section:INTEGER
 004A       DIM position:INTEGER
 0051       DIM WinType,horiz,vert:INTEGER
 0060
 0061       CREATE #OutPath,OutFileN:WRITE
 006D       Window:=1
 0074       N1:=TRUE
 007A       RunL:=0
 0081       section:=0
 0088       position:=0
```

Peter Dibble has a bachelor's degree in chemistry and is currently a graduate student in computer science. He has worked as an applications programmer, systems programmer and as the user services assistant director for the University of Rochester Computing Center. With Dale Puckett, he is the co-author of The Complete Rainbow Guide to OS-9.

nice to be able to copy images from the screen to a disk file, then restore them to the screen. It's not hard to save images this way, but a few images will fill your disk. Type 7 and Type 8 windows each take 32K of storage!

Most images can be compressed to much less than 32K. The smallest representation of an image is usually the script that created it. A window with a single circle drawn on it (or even a blank window) needs 32K of memory, but clearing the screen and displaying a circle on it takes only a few bytes of commands. If a script isn't available, we have to use other compression tricks.

There is an archiving program in the OS-9 Users Group's library that does a nice job of compressing images. Unfortunately, it does many other things as well. It's not a small program.

The compression method called run length encoding works well on images, and it is easy to program. The idea is that colors come in blobs. Instead of recording an image as

```
"red,red,red,red,black,
 black,green,black,. . ."
```

we will say

```
"4red,2black,1green,
 1black,. . ."
```

This trick usually works very well, but the wrong data can make run length encoding work very poorly. The encoding algorithm has a threshold built into it. Every time it has to code a color with a run length less than the threshold, it uses more space to store the code than the original data used. However, the larger the threshold, the better the compression (provided the runs are long enough).

The person who writes the compression algorithm gambles on the kind of

```
008F        RUN GetWinAttr(Window,WinType,horiz,vert)
00A8        PUT #OutPath,WinType
00B2        PUT #OutPath,horiz
00BC        PUT #OutPath,vert
00C6
00C7        GOSUB 100 \REM get a nyble
00D9        LNyble:=Nyble
00E1        REPEAT
00E3          GOSUB 100 \REM get a nyble
00F5          IF Nyble<>LNyble OR RunL>=15 THEN
0109            GOSUB 50 \REM put a (runl,nyble) pair
0127            LNyble:=Nyble
012F            RunL:=0
0136          ELSE
013A            RunL:=RunL+1
0145          ENDIF
0147        UNTIL section=4 AND position=0
0159        CLOSE #OutPath
015F        END
0161 50     REM Write a byte
0173        LNyble:=LOR(16*RunL,LNyble)
0182        PUT #OutPath,LNyble
018C        RETURN
018E 100    REM Get a nyble
019F        IF position=0 THEN
01AB          section:=section+1
01B6          RUN Getbuffer(Window,buffer,section)
01CA          position=1
01D1        ENDIF
01D3        IF N1 THEN
01DC          InC:=buffer(position)
01E7          Nyble:=InC/16
01F2          IF position>=7680 THEN
01FF            position:=0
0206          ELSE
020A            position:=position+1
0215          ENDIF
0217        ELSE
021B          Nyble:=InC
0223        ENDIF
0225        Nyble:=LAND($0F,Nyble)
0231        N1:=NOT(N1)
023A        RETURN
```

***

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image it will be compressing. I am conservative, so I decided to design a compression algorithm that codes run lengths of up to 16. Runs longer than 16 are coded as two runs of the same color.

The Color Computer uses one, two or four bits per pixel. It would have been best for me to write three versions of the compression algorithm: one for each number of colors. I didn't. If a window is in two-color mode, my compression program will treat each group of four pixels as one. It's not the best thing to do, but it works.

There are a few things about this program that you should notice.

- To run it, type `RUN "SaveImage"`.
- It only works on the current window.
- It stores the type and size of a window with the data from it.
- It uses `SYSCALL`.
- It's painfully slow.

It would be very nice to be able to pick an image out of another window, but OS-9 makes it difficult. Since window commands are issued by writing them to the window you want to affect, OS-9 will not process window commands for a window from which a program is reading. The shell and BASIC09 (for instance) are usually trying to read from their windows.

The compression program might be able to get away without knowing the size and type of the window it is compressing, but we'll need to know those facts when we want to redisplay the image.

The program uses `SYSCALL` four times. `GetWinAttr` uses `SYSCALL` to get the window type. `GetBuffer` uses `SYSCALL` to get its process ID to use as an image buffer number, then it uses `SYSCALL` to map an image buffer into its address space; finally it uses another `SYSCALL` to map the image buffer back out of the address space.

Results

In my tests, the run length encoding compression program worked pretty well. It usually reduced images to less than half their full size. It was, however, very slow. I only timed it once, but that time it took more than 4½ minutes to compress a window.

I think four minutes is far too long to spend compressing the data from one screen, but I can't find any way to make a dramatic improvement in the speed of the BASIC09program.

Listing 3: `GetBuffer`

```
PROCEDURE GetBuffer
 0000      PARAM Window:BYTE
 0007      PARAM buffer(7680):BYTE
 0013      PARAM section:INTEGER
 001A      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 003F      DIM regs:registers
 0048      DIM i,group:INTEGER
 0053      DIM position:INTEGER
 005A      BASE 0
 005C      RUN syscall($0C,regs)
 006A      group:=regs.a
 0075      position:=48*(section-1)
 0083      RUN gfx2(Window,"get",group,1,0,position,639,48)
 00AA      regs.a=1
 00B5      regs.b=$84
 00C1      regs.x=group*256+1
 00D4      regs.y=1
 00DF      RUN syscall($8E,regs)
 00ED      IF LAND(regs.cc,1)<>0 THEN
 00FF        ERROR regs.b
 0107      ENDIF
 0109      FOR i:=regs.y-1 TO 0 STEP -1
 0126        buffer(i):=PEEK(regs.x+i)
 013A      NEXT i
 0145      regs.x=group*256+1
 0158      regs.y=0
 0163      RUN syscall($8E,regs)
 0171      RUN gfx2("killbuff",group,1)
 0189      END
```

Listing 4: `GetWinAttr`

```
PROCEDURE GetWinAttr
 0000      PARAM Window:BYTE
 0007      PARAM typecode:INTEGER
 000E      PARAM horiz,vert:INTEGER
 0019      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 003E      DIM regs:registers
 0047      regs.a:=Window
 0053      regs.b:=$93
 005F      RUN syscall($8D,regs)
 006D      IF LAND(regs.cc,1)=1 THEN
 007F        ERROR regs.b
 0087      ENDIF
 0089      typecode:=regs.a
 0094      IF typecode<5 THEN  \REM not a graphics window
 00B8        ERROR 183 \REM illegal window type
 00D2      ENDIF
 00D4      FOR i:=5 TO typecode
 00E7        READ horiz,vert
 00F0      NEXT i
 00FB      END
 00FD      DATA 640,192
 0108      DATA 320,192
 0113      DATA 640,192
 011E      DATA 320,192
```

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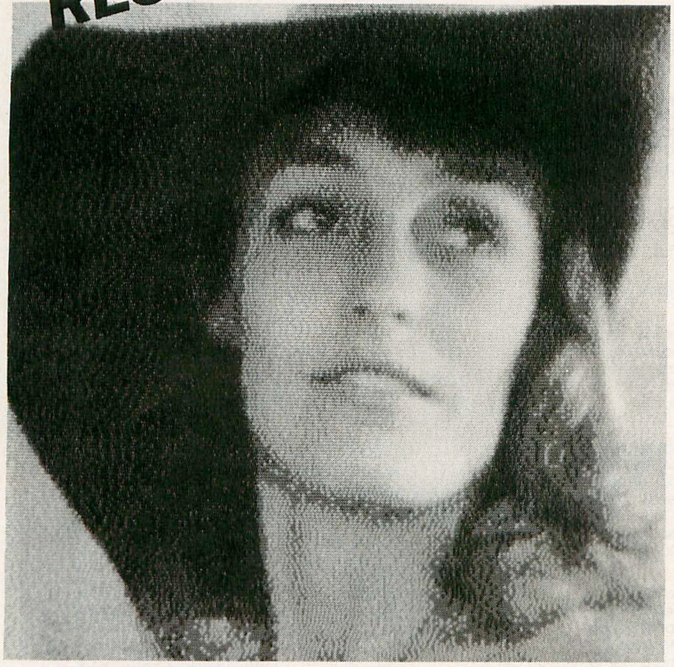

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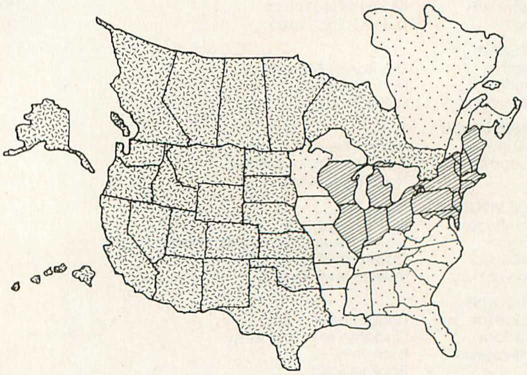

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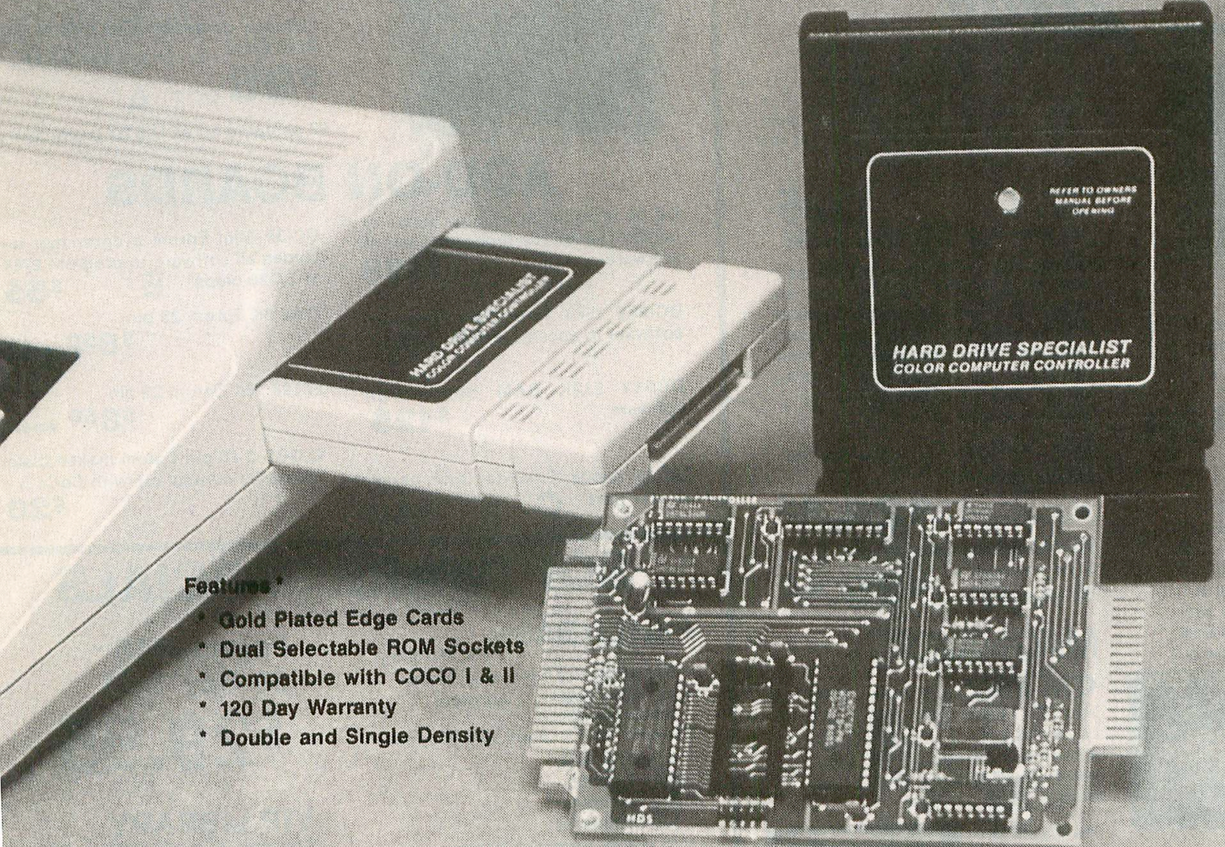
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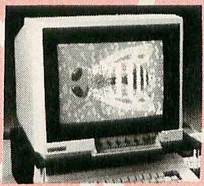

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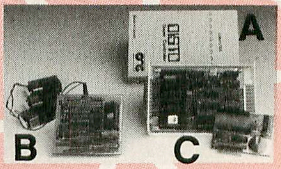

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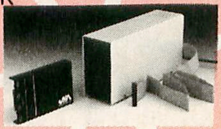

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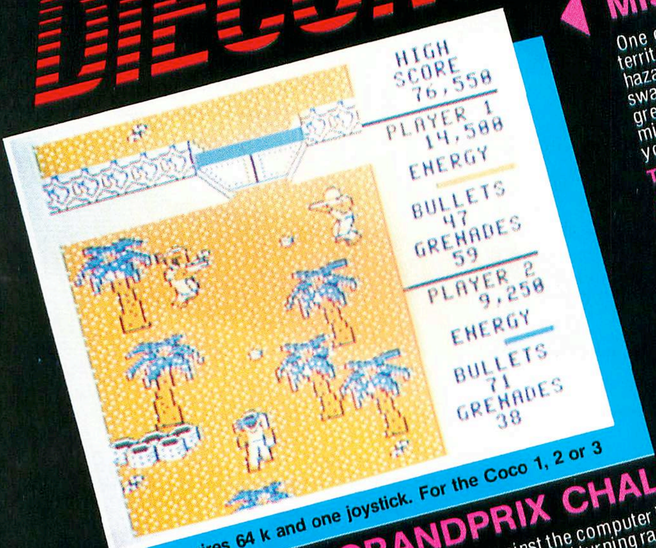
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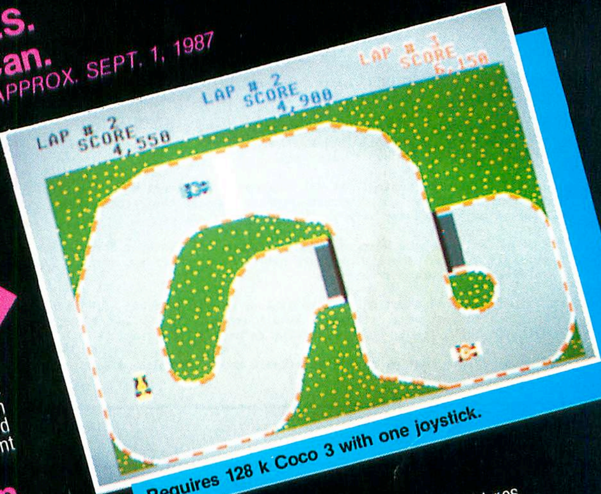
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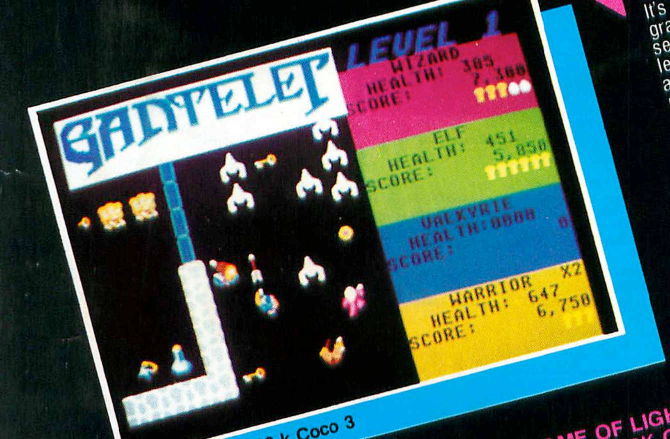
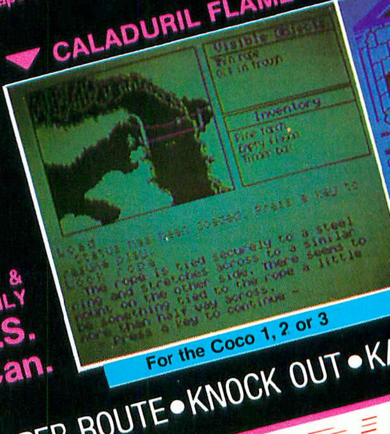
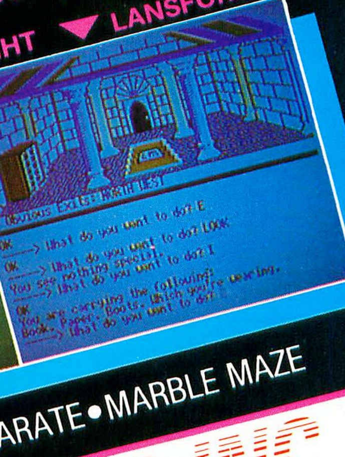

GANTELET
LEVEL 1
WIZARD 305
HEALTH: 7,300
SCORE:
ELF 451
HEALTH: 5,850
SCORE:
VALKYRIE
HEALTH: 0000
SCORE:
WARRIOR X2
HEALTH: 647
SCORE: 6,750

Requires 128 k Coco 3

▼ LANSFORD MANSION

▼ CALADURIL FLAME OF LIGHT


Visible objects
Inventory


Obvious Exits: NORTH WEST
OK ---> What do you want to do? E
---> What do you want to do? LOOK
OK ---> What do you want to do? I
You see nothing special.
You are carrying the following:
---> What do you want to do? E

For the Coco 1, 2 or 3

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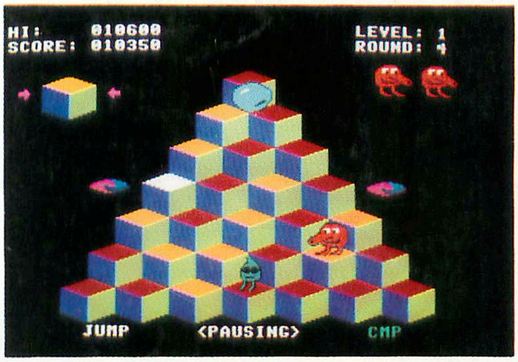

The Pyramid has long been associated with mystery and power. Now, **PYRAMIX**, for your CoCo 3, is a source of endless arcade fun.

PYRAMIX is a 100% machine language game written exclusively to take advantage of all the power in your 128K CoCo 3. The colors are brilliant, the graphics sharp, the action hot.

The object of **PYRAMIX** looks deviously simple. Just change the tops of the blocks in the pyramid to the indicated color. But the accomplishment can be elusive!

Falling boulders, the relentless pursuit of the Snake, the slow moving "death square" and precipitous falls challenge you from all sides. Then there's that little sneak with sunglasses, who undoes your hard-earned color changes if you don't catch him.

It's all quite maddening! As you reach more challenging levels, you'll find that you need to hop on the squares not once but twice in order to change their color. Or, worse yet, hopping on a square you already visited might undo the work you've just done.

But you do have some help in **PYRAMIX.** There are elevator discs. Hop on one and it will take you to the top, possibly luring the greedy Snake over the edge! If you catch a Time-Stopper Orb, time will freeze, allowing uninterrupted work for while.

PYRAMIX features the finest in animation, graphics, sound effects and game play available today. It has all the extras you want, too, such as a pause option, RGB and CMP modes, keyboard or joystick play, help screen, multiple skill level, and the ability to backup your disk.

Best of all is the low price! Available today, for only $24.95 on disk!

Dr. Preble's Prescriptions...

Basic Freedom

mental Freedom

BASIC FREEDOM! No one wants to be chained down. And yet, if you type in BASIC programs, you have been subject to involuntary servitude! The culprit? BASIC's limited EDIT command.

Demand Your BASIC FREEDOM! Developed by ColorVenture, this software gives you a **full screen editor** for typing in and editing BASIC programs! Move the cursor anywhere on the screen. Insert, delete or add text. It's the same concept as in a word processor, except you never have to leave BASIC! BASIC FREEDOM is an invisible machine language program which you can turn on and off at will. Even pressing RESET will not hurt your BASIC FREEDDOM! Simple, yet powerful with an easy to read manual. Many extra "nice touches" included, like KEY REPEAT and LOWERCASE INTERPRETER which lets you type BASIC commands in upper or lower case for ease of programming. Translation to uppercase is automatic for commands. Text in quotes is not affected.

For CoCo 1, 2, or 3!

SPECIAL COCO 3 VERSION lets you work in 32, 40, or 80 column display modes. A separate version is available for the CoCo 1 and 2. Available on disk for $29.95 + s/h.

MENTAL FREEDOM by Dr. Preble! IMAGINE! Some day, a computer so advanced that it responds to your very thoughts and emotions. Imagine, some day, **thought-controlled** graphics: levitation and materialization! **PLUG IN YOUR MIND and UNHOOK YOUR JOYSTICKS**--that day is now! The Radio Shack Color Computer has many advanced capabilities, just waiting to be tapped. Dr. Preble's Programs combines the advanced technology of the CoCo with the amazing **Radio Shack Biofeedback Monitor** to bring you **"Mental Freedom."**

For CoCo 2 or 3

THOUGHT-CONTROLLED VIDEO CHALLENGE? Unlike any video game you have ever played, our Thoughtware tests your ability to handle stress, to remain calm under adverse circumstances. **LIGHTNING FAST** reflexes will do you no good here, unless you first tame the fickle dragon of your mind. **Are you the secretely nervous type?** Many people can keep a "Poker Face" even when they are worried so that others may not notice; but can you really stop the worry itself? Find out with **Mental Freedom!**

AND IT TALKS! Did you know that the CoCo can produce incredibly realistic digital speech without a special speech synthesizer? The voice quality is so good, it sounds human! Honest. Best of all, no extra hardware is needed for speech, just some clever programming by Dr. Preble.

MENTAL FREEDOM - Next time your friends ask what your computer can do, show them **Dr Preble's Thoughtware!** Requires Radio Shack's Biofeedback Monitor Catalogue #63-675. **Mental Freedom** - TAPE or DISK $29.95 + s/h

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Emboss Grade 1 or Grade 2 Braille using your CoCo 1, 2 or 3 and a Brother Daisy Wheel printer! Fast Print to Braille conversion algorithm converts word processor files, program listings and data files into **touch readable Braille.** For use by the blind or the sighted. **No knowledge of the Braille code is necessary.** Just send print to the program and out comes Braille! Note: The complex Grade 2 conversion is very good and though not always perfect, quite readable. Requires 64K or more. Brother HR series printer or the IF-50 interface series required. Low Cost! Similar software costs 3 times as much. Only $95.

Summer Sale

BASIC FREEDOM - $19.95
Mental Freedom - $19.95

Disk Directory Dazzler

Dress up your Disk Directory with colorful messages and borders. Create useful help messages. Add that professional touch to your creations! Only $9.95

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For CoCo 1 or 2

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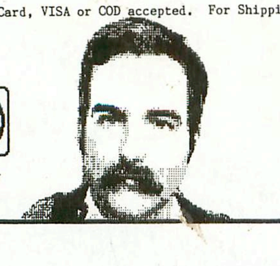

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